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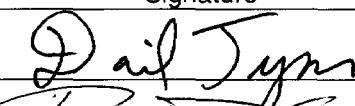
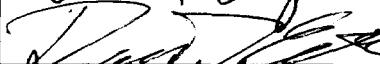
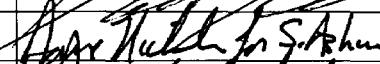
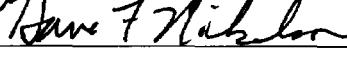
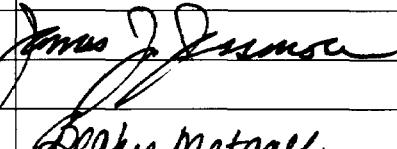
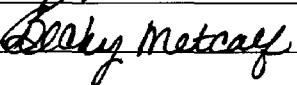
Project No. 22901

V-Tank Off-gas Data Evaluation and Remaining Inventory Determination

**Idaho
Cleanup
Project**

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EDF No.: 6364 EDF Rev. No.: 0 Project File No.: 22901

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5. Summary: The purpose of this Engineering Design File (EDF) is to determine the remaining source term for the waste in the Consolidation Tanks. V-Tank consolidation and treatment operations performed on V-Tanks prior to September 1, 2005 volatilizes and removed the majority volatile organic compounds from the V-Tank system. A re-evaluation of the waste information, based primarily the sludge, was conducted to provide a bounding projection of the VOCs that may remain in the V-Tanks system.				
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V-Tank Off-gas Data Evaluation and Remaining Inventory Determination

1. INTRODUCTION

1.1 Purpose

The purpose of this Engineering Design File (EDF) is to re-evaluate the chemical and contaminant inventory for the waste in the V-Tank system. Off-gas concentrations from consolidation sparging (air stripping) as measured with a Fourier Transform Infrared (FTIR) Spectroscopy unit have indicated that the amount of volatile organic compounds (VOCs) that have been emitted from the waste exceeded the original inventory for specific compounds. Due to an incident during waste processing, the treatment process has been placed in standby. This re-evaluation of the remaining source term is required prior to restart of the treatment system. The re-evaluation of the existing data in this EDF will:

- Address the FTIR data and provide a qualitative summary of validation
- Address flammability concerns of the suspected remaining VOCs
- Provide a characterization of the remaining waste for the restart of treatment.

The previous characterization data was re-examined and a modified statistical approach using log-normal distributions was applied. The FTIR data was evaluated to in comparison with the characterization data. The projection of the remaining waste contaminant concentrations was adjust in consideration of the FTIR data on volatilized species of interest.

1.2 Background

The V-Tanks consist of four underground storage tanks at Test Area North that contain waste from various TAN activities. Disposition of these tanks are covered by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as well as the Resource Conservation and Recovery Act (RCRA). The planned treatment for the tank contents was to pump out the contents of the tanks into “consolidations tanks”, where the contents of each of the four tanks (Tanks V-1, V-2, V-3, and V-9) would be homogenized and air-sparged. The air-sparge is intended to remove the volatile organic compound source contaminants (trichloroethylene [TCE], tetrachloroethylene [PCE], and 1,1,1-trichloroethane [TCA]) by volatilizing them to an off-gas system. The original off-gas system included two carbon beds in parallel, with a spare bed that could be inserted near the exhaust stack. The current design concept will not have any carbon adsorption or other means of removing volatilized organic compounds.

2. QUALIFICATION OF FTIR DATA

2.1 Off-gas measurements

The primary VOC contaminants of concern for treatment are three chlorinated hydrocarbon solvents: TCE, PCE, and TCA. The original approach to the process monitoring of the project was to use Sensidyne tubes that are specific to these three organics and pull air samples from both prior to the granular activated carbon (GAC) beds (denoted as **inlet**) and from sampling access ports downstream of the beds (denoted as **exhaust**). An FTIR unit was on loan to the project and this unit was set to measure a list of volatile species (see Table 1). The FTIR was automated and provided an off-gas concentration reading approximately every ten minutes – alternating between an inlet reading and an outlet reading^a. For the purpose of determining the amount of organics emitted from the waste, the inlet readings from the FTIR unit were used in this EDF. Approximately every twenty minutes, a set of inlet concentrations were generated from the FTIR unit. Table 2 shows an actual off-gas measurement that was saved as an Excel file. This file is one of many in a directory and was saved as an Excel file with the name: “C:\GasAnalysisData\Freon\InltD_081505_170824.csv”, with the “InltD” indicating that this is an inlet reading from a diluted sample, the “081505” indicating the sample date of August 15, 2005, and the “170824” indicating the time of 5:08 pm. Since the unit was automated, the offgas was sampled around the clock with the results being written to stored files.

Table 1. FTIR monitored species during the V-tank project that were positively identified.

Carbon Tetrachloride	111-Trichloroethane
Chloroform	11-Dichloroethane
Dichloromethane	12-Dichloroethane
Chloromethane	Chloroethane
Perchloroethene	Methyl Isobutyl Ketone
Trichloroethene	Acetone
cis-12-Dichloroethene	Methyl Ethyl Ketone
11-Dichloroethene	Toluene
Vinyl Chloride	

2.2 FTIR Spectra Analysis for Positively Identified Species

A subject-matter expert, William Bauer of Battelle Energy Alliance, was utilized to perform a quality check of the FTIR spectra data that had been obtained during Tank V-9 waste transfer. Certain key spectra, based on timeframes of events occurring during transfer or sparging, were chosen for the quality check. These spectra (2 inlet and 1 exhaust) were from (1) a diluted inlet on August 20th at 10:40 AM, (2) an undiluted inlet on August 20th at 4:14 PM, and (3) an undiluted exhaust on August 19th at 11:55 PM. Detailed information on the analysis and presentation of the spectra are presented in Appendix A. The spectra are shown in three regions: low wave numbers, high wave numbers, and mid-range wave numbers.

a. To reiterate, the inlet is the inlet to the GAC and the outlet or exhaust is what is leaving the GAC. The inlet reading represents what is being emitted from the waste and is not an inlet stream to the waste.

2.2.1 Compound Identification

In short, for the inlet stream going into the granulated activated carbon (GAC) beds, relatively high concentrations of trichloroethene (TCE), 1,1,1-trichloroethane (111-TCA), and tetrachloroethene (PCE) were noted. Dichloromethane (CH_2Cl_2 , or methylene chloride, or MeCl_2) was also noted at significant concentrations. Chloroform and 1,2-dichloroethane may also be present at low concentrations in INLT_082005_104004, however it is difficult to tell because the 111-TCA and TCE concentrations are so high. Other compounds that were noted were simple hydrocarbons at 20-30 ppm_v which were more closely related to the combination seen in kerosene than gasoline. An additional compound noted in the spectra associated with INLT_082005_104004 was possibly an ether.

Table 2. Data File from an inlet port sample analyzed by the FTIR unit.

C:\GasAnalysisData\Freon\InltD_081505_170824.csv

#NAME? Cal File	Compound	ppmv	Dilution	Factor
C:\OpusViaLabView\CTet-r1a-PLS.txt	Carbon Tetrachloride-p	<0.07	FALSE	0
C:\OpusViaLabView\CTet-r3a-PLS.txt	Carbon Tetrachloride-s	<0.06	FALSE	0
C:\OpusViaLabView\CIForm-r1a-PLS.txt	Chloroform-s	0.45	FALSE	0
C:\OpusViaLabView\CIForm-r4a-PLS.txt	Chloroform-p	<0.64	FALSE	0
C:\OpusViaLabView\CIForm-r6a-PLS.txt	Chloroform-s	<0.11	FALSE	0
C:\OpusViaLabView\MeCl2-r2a-PLS.txt	Dichloromethane-s	<0.01	FALSE	0
C:\OpusViaLabView\ClMeth-r3a-PLS.txt	Chloromethane-p	<1.85	FALSE	0
C:\OpusViaLabView\PCE-r1a-PLS.txt	Perchloroethene	4.63	FALSE	0
C:\OpusViaLabView\TCE-r1a-PLS.txt	Trichloroethene-s	2.5	FALSE	0
C:\OpusViaLabView\TCE-r3a-PLS.txt	Trichloroethene-p	<1.79	FALSE	0
C:\OpusViaLabView\c12DCE-r1a-PLS.txt	cis-12-Dichloroethene	<0.34	FALSE	0
C:\OpusViaLabView\11DCE-r4a-PLS.txt	11-Dichloroethene-p	<0.48	FALSE	0
C:\OpusViaLabView\11DCE-r6a-PLS.txt	11-Dichloroethene-s	<0.40	FALSE	0
C:\OpusViaLabView\VC-r1a-PLS.txt	Vinyl Chloride-p	<0.60	FALSE	0
C:\OpusViaLabView\VC-r3a-PLS.txt	Vinyl Chloride-s	<1.59	FALSE	0
C:\OpusViaLabView\111TCA-r1a-PLS.txt	111-Trichloroethane-p	0.45	FALSE	0
C:\OpusViaLabView\111TCA-r4a-PLS.txt	111-Trichloroethane-s	<0.24	FALSE	0
C:\OpusViaLabView\111DCA-r3a-PLS.txt	11-Dichloroethane-p	<0.28	FALSE	0
C:\OpusViaLabView\111DCA-r5a-PLS.txt	11-Dichloroethane-s	<0.28	FALSE	0
C:\OpusViaLabView\122DCA-r1a-PLS.txt	12-Dichloroethane-p	<2.82	FALSE	0
C:\OpusViaLabView\122DCA-r2a-PLS.txt	12-Dichloroethane-s	<1.01	FALSE	0
C:\OpusViaLabView\ClEthane-r1a-PLS.txt	Chloroethane	<4.03	FALSE	0
C:\OpusViaLabView\ClEthane-r3a-PLS.txt	Chloroethane	<0.77	FALSE	0
C:\OpusViaLabView\Methane-r2a-PLS.txt	Methane	<0.81	FALSE	0
C:\OpusViaLabView\Ethene-r1a-PLS.txt	Ethene	<1.09	FALSE	0
C:\OpusViaLabView\Ethane-r1a-PLS.txt	Ethane	<0.40	FALSE	0
C:\OpusViaLabView\Acetylene-r1a-PLS.txt	Acetylene	0.08	FALSE	0
C:\OpusViaLabView\Propane-r1a-PLS.txt	Propane	<0.09	FALSE	0
C:\OpusViaLabView\HCl-r1-PLS.txt	Hydrogen Chloride	<0.19	FALSE	0

Table 2. (continued).

#NAME? Cal File	Compound	ppmv	Dilution	Factor
C:\OpusViaLabView\HCS-r1a-PLS.txt	> C6 Hydrocarbons	1.62	FALSE	0
C:\OpusViaLabView\MeOH-r2a-PLS.txt	Methanol-2	2.62	FALSE	0
C:\OpusViaLabView\MIBK-r2a-pls.txt	MIBK-2	<0.42	FALSE	0
C:\OpusViaLabView\MIBK-r3a-pls.txt	MIBK-3	<0.40	FALSE	0
C:\OpusViaLabView\acetone-r1a-pls.txt	Acetone	<0.42	FALSE	0
C:\OpusViaLabView\BuOH-r3a-PLS.txt	Butanol-3	1.96	FALSE	0
C:\OpusViaLabView\MEK-r2a-PLS.txt	MEK-2	27.82	FALSE	0
C:\OpusViaLabView\MEK-r3a-PLS.txt	MEK-3	4.95	FALSE	0
C:\OpusViaLabView\EthylEther-r1a-PLS.txt	Ethyl Ether	0.45	FALSE	0
C:\OpusViaLabView\N2O-r1a-PLS.txt	Nitrous Oxide-1	< 0.56	FALSE	0
C:\OpusViaLabView\N2O-r3a-PLS.txt	Nitrous Oxide-3	< 1.41	FALSE	0
C:\OpusViaLabView\COS-r1a-PLS.txt	Carbonyl Sulfide	< 0.02	FALSE	0
C:\OpusViaLabView\CS2-r1a-PLS.txt	Carbon Disulfide	<0.06	FALSE	0
C:\OpusViaLabView\14dioxane-r1a-PLS.txt	14-Dioxane-1	0.87	FALSE	0
C:\OpusViaLabView\14dioxane-r2a-PLS.txt	14-Dioxane-2	<0.32	FALSE	0
C:\OpusViaLabView\TMA-r1a-PLS.txt	Trimethylamine	<0.05	FALSE	0
C:\OpusViaLabView\NH3-r1a-PLS.txt	Ammonia	<0.46	FALSE	0
C:\OpusViaLabView\PFTBA-r1a-pls.txt	Perfluorotributylamine	<0.07	FALSE	0
C:\OpusViaLabView\AcetAc-r1a-PLS.txt	Acetic Acid-1	<0.24	FALSE	0
C:\OpusViaLabView\Acetald-r1a-PLS.txt	Acetaldehyde	0.62	FALSE	0
C:\OpusViaLabView\Ethylacetate-r1a-PLS.txt	Ethylacetate	0.82	FALSE	0
C:\OpusViaLabView\EtOH-r1a-PLS.txt	Ethanol	<0.64	FALSE	0
C:\OpusViaLabView\MethAcetate-r2a-PLS.txt	Methylacetate-2	0.37	FALSE	0
C:\OpusViaLabView\MethAcetate-r3a-PLS.txt	Methylacetate-3	1.03	FALSE	0
C:\OpusViaLabView\IPA-r1a-PLS.txt	Isopropanol	<0.38	FALSE	0
C:\OpusViaLabView\Toluene-r1a-PLS.txt	Toluene-1	<0.52	FALSE	0
C:\OpusViaLabView\Toluene-r3a-PLS.txt	Toluene-3	<0.42	FALSE	0
C:\OpusViaLabView\Freon113-r1a-PLS.txt	Freon113-1	0.14	FALSE	0
C:\OpusViaLabView\Freon113-r2a-PLS.txt	Freon113-2	<0.07	FALSE	0
C:\OpusViaLabView\CO-r1a-PLS.txt	CO-1	<0.28	FALSE	0

The only compounds in the spectral library used for the analysis that had the spectral feature near the wave number of 2825 cm^{-1} were ethers. Inspection of the spectrum utilized methyl tert-butyl ether (MTBE) as the model ether compound. The spectral shape at 2525 cm^{-1} was similar to MTBE, however, MTBE is not the compound since the rest of the spectral shape does not match well. Assuming MTBE, the ether-like compound concentration was estimated at $\sim 38 \text{ ppm}_v$.

The exhaust sample (the undiluted exhaust reading from August 19th at 11:55 PM) shows only trace levels of TCE and 111-TCA. Dichloromethane is at ~12.4 ppm_v. The elevated concentrations of dichloromethane relative to TCE and 111-TCA in the gas stream after the GAC column is not unexpected given the low preference of dichloromethane for GAC.^b

2.2.2 Alcohols and Ketones

From the FTIR data, there were alcohols and ketones that were identified in the off-gas, but had not been evident from waste characterization from laboratory analysis on waste samples. The spectra were inspected to see if these species did exist in the waste for the updated characterization effort. From the spectra presented in Appendix A, no spectral features were noted in the fingerprint region, the C-H stretching region or elsewhere in the sample spectra that would give the indication of alcohols or ketones at levels above the range of 0.5-1 ppm_v in the original samples. The detection limit range for these compounds is based upon the assumptions that:

1. a spectral feature exists in the original sample at >0.003 absorbance units, and that
2. the spectral feature can readily be distinguished from the major components (111-TCA and TCE) and background at a total sample pressure 600-640 mm Hg. In cases where the spectral features are overwhelmed by 111-TCA or TCE spectral features, the detection limits may be somewhat greater than the 0.5-1 ppm_v range.

2.3 Mass of Emitted Species

The output from the FTIR unit was used to approximate masses of VOCs that emitted from transfer and sparging. The protocol followed the following routine:

1. From the daily records, there are about 70 to 75 inlet readings. These inlet readings were averaged to come up with a daily average for each species of interest.
2. The daily averages were converted to an average release rate (lb/hour) by the use of the following equation where C_X is the gas phase concentration in ppm_v of specie X and M_X is the molecular weight in g/mol of specie X.

$$\text{mass rate } \left(\frac{\text{lb}}{\text{hr}} \right) = \left(\frac{C_X \left(\frac{300 \text{ sft}^3}{\text{min}} \right) \left(\frac{28.3 \text{ sL}}{\text{sft}^3} \right) \left(\frac{60 \text{ min}}{\text{hr}} \right)}{\left(\frac{22.4 \text{ sL}}{\text{mol}} \right) \left(\frac{453.6 \text{ g}}{\text{lb}} \right) (1.0E + 06)} \right) M_X$$

$$\text{mass rate } \left(\frac{\text{lb}}{\text{hr}} \right) = 5.01E - 05 M_X$$

3. Multiply the mass rate by 24 hours to determine the daily mass in pounds expelled from the waste.

^b <http://www.lenntech.com/adsorption.htm>.

4. All the days of operation were listed (see Table 3) and summed for the various species to come up with the total amount that is liberated from V-Tank transfer and sparging. (**NOTE:** Beginning at midday on the 22nd of August, the blower on the North leg was shut down to direct the flow to the South bed. The flowrate was reduced by 1/3 to reduce the flow from 300 scfm to 200 scfm.)

Table 3. The daily masses evolved from the V-tank treatment activities during the period of FTIR monitoring. (Italics are molecular weight).

Date	Units	Carbon Tetrachloride	Chloroform	Dichloromethane	Chloromethane	Perchloroethene	Trichloroethene	Dichloroethene	11-Chloroethene	cis-12-Dichloroethene	111-Trichloroethane	Dichloroethane	Chloroethane
		<i>154</i>	<i>120</i>	<i>85</i>	<i>51</i>	<i>166</i>	<i>732</i>	<i>98</i>	<i>63</i>	<i>134</i>	<i>100</i>	<i>100</i>	<i>65</i>
7/20/2005	kg	9.66E-03	9.15E-02	3.75E-04	2.19E-02	7.73E-03	2.25E-02	4.53E-03	9.36E-03	1.10E-02	3.36E-03	6.97E-03	4.74E-02
7/21/2005	kg	6.40E-03	5.19E-02	2.76E-04	1.60E-02	7.03E-03	1.15E-02	5.45E-03	4.19E-03	6.50E-03	5.78E-03	8.54E-02	4.79E-03
7/22/2005	kg	3.75E-04	3.22E-02	1.75E-04	2.81E-03	1.25E-03	1.94E-03	7.23E-04	1.19E-03	1.29E-03	2.42E-03	8.05E-02	6.18E-04
7/23/2005	kg	5.04E-04	3.83E-02	2.00E-04	5.11E-03	1.37E-03	2.95E-03	2.97E-04	1.82E-03	2.34E-03	0.00E+00	4.27E-03	6.78E-02
7/24/2005	kg	8.34E-03	2.02E-01	1.67E-03	1.82E-02	1.80E-02	4.08E-03	9.16E-03	6.43E-03	3.46E-02	9.70E-05	3.70E-03	5.74E-04
7/25/2005	kg	1.71E-02	4.08E-01	3.58E-03	3.34E-02	3.81E-02	2.15E-02	1.84E-02	1.43E-02	7.27E-02	6.81E-03	4.84E-03	1.47E-01
7/26/2005	kg	2.48E-02	5.44E-01	5.02E-03	5.58E-02	5.56E-02	2.83E-02	2.90E-02	2.08E-02	1.09E-01	9.01E-03	7.10E-03	1.21E-02
7/27/2005	kg	6.59E-04	4.69E-02	2.05E-04	2.57E-03	1.35E-02	3.95E-03	5.69E-04	1.35E-03	2.35E-05	4.44E-03	8.05E-02	2.38E-03
7/28/2005	kg	9.49E-04	4.84E-02	2.38E-04	2.87E-03	8.45E-03	5.00E-03	7.36E-04	1.43E-03	1.74E-03	5.67E-05	4.10E-03	5.80E-02
7/29/2005	kg	1.61E-04	4.26E-02	1.84E-04	2.47E-03	2.06E-03	1.93E-03	3.17E-04	1.71E-03	1.15E-03	0.00E+00	3.47E-03	6.94E-02
7/30/2005	kg	2.89E-02	6.37E-01	5.80E-03	5.73E-02	6.44E-02	1.72E-02	3.45E-02	2.21E-02	1.22E-01	7.16E-03	5.59E-03	1.09E-01
7/31/2005	kg	1.64E-02	3.82E-01	3.32E-03	2.82E-02	3.66E-02	4.94E-02	1.89E-02	1.36E-02	7.11E-02	1.93E-02	1.06E-02	2.27E-02
8/1/2005	kg	8.54E-04	4.63E-02	2.33E-04	5.15E-03	3.33E-03	2.23E-02	1.08E-03	1.02E-03	2.65E-03	5.31E-03	5.43E-03	9.18E-03
8/2/2005	kg	9.26E-04	4.92E-02	2.27E-04	2.71E-03	5.53E-03	3.73E-03	2.59E-04	1.52E-03	1.52E-03	0.00E+00	3.12E-03	6.40E-02
8/3/2005	kg	8.27E-04	4.60E-02	2.12E-04	2.08E-03	5.05E-03	3.89E-03	1.11E-04	1.26E-03	8.16E-04	3.22E-04	3.80E-03	7.51E-02
8/4/2005	kg	6.75E-04	7.00E-02	2.83E-04	1.48E-03	1.13E-02	6.37E-03	3.19E-05	7.74E-04	3.02E-03	7.95E-05	7.24E-03	1.04E-03
8/5/2005	kg	1.93E-03	9.51E-02	5.11E-04	3.76E-03	3.64E-01	9.35E-02	5.90E-04	1.78E-02	5.33E-03	8.71E-05	6.84E-03	7.59E-02
8/6/2005	kg	1.17E-03	9.56E-02	4.44E-04	2.44E-03	1.97E-02	4.43E-03	9.54E-04	9.54E-04	2.03E-04	6.21E-03	8.78E-02	2.03E-03
8/7/2005	kg	1.05E-03	8.18E-02	3.56E-04	3.37E-03	7.70E-03	3.88E-03	6.52E-04	6.52E-04	8.46E-05	5.14E-03	8.46E-03	1.82E-03
8/8/2005	kg	7.28E-04	7.29E-02	2.63E-04	2.43E-03	1.03E-01	2.47E-02	6.37E-03	7.74E-04	3.02E-03	7.95E-05	7.24E-03	1.29E-03
8/9/2005	kg	1.09E-03	8.15E-02	3.65E-04	5.02E-03	4.07E-02	1.03E-02	5.90E-04	5.90E-04	5.33E-03	8.71E-05	6.84E-03	7.59E-02
8/10/2005	kg	9.27E-04	9.25E-02	4.25E-04	3.23E-03	9.44E-02	3.37E-02	4.91E-03	4.91E-03	5.48E-03	5.48E-03	5.48E-03	1.05E-03
8/11/2005	kg	2.80E-03	8.00E-02	3.21E-04	4.21E-03	8.15E-01	5.01E-02	2.02E-04	3.42E-02	2.88E-03	1.72E-04	8.20E-03	9.83E-02
8/12/2005	kg	1.83E-03	1.01E-01	4.93E-04	5.91E-03	1.18E-01	2.43E-03	6.37E-03	6.37E-03	1.86E-03	5.20E-05	5.20E-05	8.80E-04
8/13/2005	kg	1.92E-02	4.50E-01	3.79E-03	4.55E-02	3.28E-01	1.50E-02	1.03E-02	1.03E-02	4.24E-03	3.60E-03	1.11E-04	5.85E-03
8/14/2005	kg	1.06E-02	2.03E-01	1.27E-03	1.07E-02	1.24E+00	5.19E-02	3.37E-02	5.20E-04	4.78E-03	5.07E-04	4.78E-03	6.08E-04
8/15/2005	kg	5.01E-03	9.61E-02	5.46E-04	4.00E-03	9.40E-01	4.13E-02	5.01E-02	2.02E-04	3.42E-02	2.88E-03	1.72E-02	9.03E-04
8/16/2005	kg	9.27E-04	7.28E-02	2.27E-01	1.51E-03	1.59E-02	1.21E-02	5.37E-05	5.37E-05	6.37E-04	6.37E-04	6.37E-04	4.73E-04
8/17/2005	kg	5.01E-03	9.61E-02	5.46E-04	4.21E-03	8.15E-01	5.01E-02	5.01E-02	5.01E-02	5.01E-02	5.01E-02	5.01E-02	5.21E-02
8/18/2005	kg	1.17E-02	2.27E-01	1.51E-03	1.59E-02	1.86E+00	2.45E-02	3.73E-03	3.73E-03	2.58E-02	2.58E-02	2.58E-02	4.73E-04
8/19/2005	kg	8.84E-03	7.46E-01	7.13E-03	2.73E-01	7.19E-01	7.48E+00	1.93E-02	1.93E-02	2.64E-02	2.64E-02	2.64E-02	4.22E-02
8/20/2005	kg	3.11E-02	1.03E+00	1.03E-01	1.22E-02	9.05E-01	3.44E+00	5.19E-02	5.19E-02	5.65E-02	5.65E-02	5.65E-02	5.44E-02
8/21/2005	kg	0.00E+00	3.26E-01	3.37E-03	1.23E-01	2.89E+00	9.00E+00	4.00E+00	4.00E+00	7.53E-04	7.53E-04	7.53E-04	7.14E-02
8/22/2005	kg	4.08E-02	1.06E+00	1.41E-02	1.35E+00	3.06E+00	4.79E+01	8.62E-01	8.62E-01	2.52E-01	2.52E-01	2.52E-01	2.52E-01
8/23/2005	kg	4.13E-03	7.61E-01	8.50E-03	5.16E-01	1.41E+00	1.96E+01	3.71E-01	3.71E-01	5.63E-01	5.63E-01	5.63E-01	5.50E-04
8/24/2005	kg	9.05E-03	5.84E-01	6.78E-03	4.66E-01	1.39E+00	1.96E+01	3.73E-01	3.73E-01	3.54E+00	3.54E+00	3.54E+00	3.54E+00
8/25/2005	kg	0.00E+00	1.35E-01	1.63E-03	1.13E-01	4.46E-01	5.47E+00	0.00E+00	0.00E+00	1.06E-01	1.06E-01	1.06E-01	5.36E-02
Total lbs		2.69E-01	9.05E+00	8.60E-02	4.11E+00	1.96E+01	1.44E+02	1.64E-01	3.19E+00	2.49E+00	2.79E+01	1.89E-01	4.30E+00
Total kgss		5.93E-01	1.99E+										

3. EVALUATION OF THE FLAMMABILITY OF THE “QUALIFIED” FTIR-DETECTED GAS MIXTURE

A previous evaluation of the flammability of the chlorinated hydrocarbons was performed in EDF-4775. This presented two bounding off-gas concentrations, based on equilibrium values coming out of a sparge operation. Using lower explosion limits (LELs), the conclusion was that the chlorinated hydrocarbons would not form a flammable mixture. Table 4 is taken from EDF-4775 and represents a worst-case type of emitted VOC mixture. For an offgas concentration of TCE and TCA at 43,500 and 10,400 ppm_v, respectively, the lower flammability limit as calculated using Le Chatelier’s Rule has a percent value of 7.34 vol% with the worst-case gas still being at a concentration lower than this value (6.99 vol%).

Table 4. Determination of the lower flammability level from the estimated off-gas resulting from worst-case liquid phase makeup.

Constituent	Offgas concentration in ppmv	Mole % in Off-gas	Y _i	LFL _i	Y _i /LFL _i
Trichloroethylene	4.35E+04	4.35E+00	6.22E-01	8	7.77E-02
Chloromethane	5.23E+02	5.23E-02	7.47E-03	8.1	9.23E-04
Bromomethane	1.01E+04	1.01E+00	1.44E-01	10	1.44E-02
1,1,1-Trichloroethane	1.04E+04	1.04E+00	1.48E-01	7	2.12E-02
Vinyl Chloride	4.01E+03	4.01E-01	5.73E-02	3.6	1.59E-02
Methylene Chloride	2.96E+02	2.96E-02	4.24E-03	12	3.53E-04
1,1-Dichloroethylene	2.64E+02	2.64E-02	3.77E-03	5.4	6.99E-04
Trans-1,2-Dichloroethylene	2.47E+02	2.47E-02	3.54E-03	5.6	6.31E-04
1,2-Dichlorobenzene	1.51E+02	1.51E-02	2.16E-03	2.2	9.81E-04
1,2,4-Trichlorobenzene	1.02E+02	1.02E-02	1.46E-03	2.3	6.33E-04
1,3-Dichlorobenzene	1.90E+02	1.90E-02	2.72E-03	2.1	1.29E-03
1,4-Dichlorobenzene	2.64E+02	2.64E-02	3.78E-03	2.5	1.51E-03
Column Totals	6.99E+04	6.99E+00			1.36E-01
LFL of VOC mixture					7.34E+00

Through FTIR spectra evaluation, other constituents not in the initial characterization of the V-Tank waste, but present in the off-gas, possess flammability capabilities. These constituents are kerosene^c (20 to 30 ppm_v) and a potential ether (38 ppm_v). The model for the ether that was used by William Bauer was methyl tert-butyl ether (MTBE). The off-gas has approximately 38 ppm_v MTBE (or any other ether). The LEL for identified ethers were at least 1.4% or higher, thus there are no flammability issues with respect to ethers.

4. DETERMINATION OF THE REMAINING INVENTORY

4.1 Re-Characterization of the Initial Inventory

Previous characterization of the V-Tank waste is provided in the following documents:

- DOE/ID-10875, *Comprehensive RD/RA Work Plan for the TAN, WAG 1, OU 1-10, Group 2 Sites*, Rev. 0, March 2, 2001.
 - Appendix G. TANK V-9 ANALYTICAL SAMPLE RESULTS REPORT
 - Appendix H. V-TANKS CHARACTERIZATION SAMPLING DATA
- EDF-3868, *V-Tank Analytical Data – Calculated Averages and Upper Confidence Limits*, Rev. 1, December 8, 2003.

The first reference provides the analytical data. The second reference provides the entire V-tank waste inventory presented as 95% upper confidence limit (UCL) concentrations based on calculations that employed a statistical approach to combining the data. Table 5 shows the analytical data set that was used to calculate the source term for the V-tank waste.

In order to characterize the waste from Tanks V-1, V-2, V-3, and V-9 as a single waste form, as was done in EDF-3868, the data from each tank was combined and the errors from the data points were propagated. Per the evaluation in that EDF, various parameters, such as percent solids, densities, volumes, and contaminant concentrations, were calculated to provide averages, standard errors, and degrees of freedoms. The averages were used in the calculations, while the standard errors and degrees of freedoms were recalculated for the base calculations.^d The 90 and 95% upper confidence limits (UCLs) were calculated based on the normal distribution t-values. Since the body of data was extensive, the normal distribution was employed. All of this rationale is based on the V-Tanks waste as representing a single waste stream where all of the data are of one population group. The design of the offgas system in EDF-4956 was based on 56.4 kg (124 lb) of VOCs, which was derived from the 95% UCL calculations.

- The V-Tank characterization was based on a single population.

The previous characterization assumed a single population and the averages of each tank was used to perform calculations. The standard errors used for the 95% UCL were based on the propagation of the individual standard errors. Although this methodology is statistically sound, idiosyncrasies within the waste tanks, particularly the separation tank (Tank V-9), may have resulted in

c. From the FTIR evaluation, these are flagged as C>6, or as carbon chains longer than 6. Kerosene is the chemical specified for this analysis.

d. For a more detailed description of the equations used to determine a combined standard error and degree of freedom, the reader should go to EDF-3868 – see Appendix A of that EDF.

minimizing the effect of the load within Tank V-9. The corrective action to this would be to calculate unique 95% UCLs for each tank to develop “worst-case” and use an additive effect of the 95% UCLs to allow for maximization of source terms. Although it is recognized that thi technique does not follow statistical protocol for the formulation of a composite 95% UCL, it should serve to place a worst-case cap on the values.

- The calculation of the 95% UCL was based on a normal distribution.

Due to the entire body of data, a normal distribution was assumed. The corrective action is to use the lognormal distribution for Tank V-9 (or the larger value between a normal and a lognormal for a given contaminant).

Using these assumptions and working in an Excel Spreadsheet format, the data was rebaselined per the assumptions. Table 5 shows the analytical sample data for the waste in the V-tanks. The values from Table 5 are presented as concentrations reported for wet sludge concentrations except for the semivolatile organic compounds (SVOCs) that are presented as concentrations reported for dry sludge concentrations. An adjustment to the wet sludge concentrations was performed for all of the SVOCs. These composition concentrations were used for development of the inventory values. From this data, Tables 6 and 7 show the calculated values that go in to the rebaselined data. The main assumption in this characterization re-evaluation is to assume that the majority of the mass of a given source term specie resides in the sludge phase. This is particularly true for the VOCs of concern (TCE, PCE, and TCA). Only sludge phase concentrations were used to determine the mass for each of the chemical species. The entire mass of the consolidated V-tank waste ($4.59E+4$ kg) was used to convert the individual species mass into a composite concentration. These masses and concentrations would be the basis for the re-characterization of the initial V-tank waste. For species such as chloride or tritium, that have a significant amount partitioned into the liquid phase, the re-calculated concentrations would not be as bounding as the concentrations from the original characterization. As presented in Table 7, the re-calculated concentrations are compared to the original characteristic concentrations, with the maximums of the two values used. This will ensure that the re-characterization does not erroneously underestimate.

The sludge concentration data for the individual tanks in Table 5 were put through the following:

- Averages, standard errors, and 95% UCLs based on normal distributions were calculated from data in Table 5 for Tanks V1, V2, V3, and V9 and is presented in Table 6.
- Averages and standard deviations of the natural logs, $H_{95\%}$ parameter values, and 95% UCLs based on log-normal distributions were calculated from data in Table 5 for TankV9 and is presented in Table 6.
- The high concentration for 95% UCL for Tank V9 between the normal and log-normal is presented in Table 6. This high value will be used as the Tank V-9 concentration.

The sludge concentration calculated concentrations (95% UCL) for each tank from Table 6 were manipulated in Table 7 in the following ways:

- The calculated concentrations (95% UCL) for each tank (columns 2, 3, 4, and 5 of Table 7) were multiplied by the wet sludge weight of each tank (2001 kg in Tank V1, 1769 kg in Tank V2, 2512 kg in Tank V3, and 1065 kg in Tank V9). The sum of the resultant masses is presented in column 6 of Table 7.

- The masses from column 6 of Table 7 were divided by the total consolidated V-tank waste weight of 4.59E+4 kg to determine the re-baselined concentrations. Column 7 of Table 7 have the original characterization concentrations. Column 8 presents the maximum of the two concentrations. Column 10 shows the re-tabulated weights.
- The re-baselined data will be adjusted in subsequent sections to account for sparging losses.

Table 5. The source data used for characterization of the V-Tanks.

Constituent	Tank V-1					Tank V-2					Tank V-3					Tank V-9	
	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2
Units = Weight Fraction																	
Al	0.006					0.01					0.008					2.92E-03	
Ca	0.02					0.02					0.02					7.13E-03	
Cr	0.006					0.01					0.0008					1.95E-03	
Fe	0.03					0.05					0.05					1.60E-02	
Mg	0.03					0.02					0.03					9.41E-03	
Mn	0.008					0.02					0.01					4.66E-03	
Si	0.24					0.2					0.19					7.37E-02	
P	0.11					0.12					0.13					4.32E-02	
Sb	2.79E-06	6.31E-06	5.93E-06	5.17E-06	3.18E-06	2.54E-06	1.63E-06	1.85E-06	3.43E-06	2.06E-06	1.24E-06	2.07E-06	2.06E-06	6.40E-06	2.22E-05		
As	2.17E-06	4.01E-06	2.55E-06	3.70E-06	1.76E-06	2.82E-06	2.06E-06	2.96E-06	2.07E-06	2.32E-06	5.15E-04	2.32E-04	2.25E-04	3.70E-06	3.80E-06		
Ba	2.24E-05	2.78E-05	7.48E-05	3.73E-05	2.19E-05	2.69E-05	2.20E-05	2.69E-05	3.35E-05	2.46E-05	2.57E-05	2.46E-05	2.25E-05	5.15E-04	5.00E-05		
Be	2.62E-06	3.95E-06	1.77E-05	4.39E-06	2.19E-06	2.25E-06	3.04E-06	3.77E-06	5.70E-06	1.36E-05	9.87E-06	1.56E-05	7.41E-06	5.75E-06	5.00E-05		
Cd	1.07E-05	1.50E-05	3.30E-05	2.16E-05	1.38E-05	1.07E-05	1.07E-05	1.36E-05	1.56E-05	7.41E-06	5.00E-04	5.92E-04	5.40E-04	5.92E-04	5.00E-06		
Fluoride	5.00E-06																
Pb	1.76E-04	2.40E-04	3.18E-04	3.10E-04	1.68E-04	2.04E-04	2.06E-04	1.12E-04	1.78E-04	2.06E-04	2.04E-04	2.06E-04	2.05E-04	2.11E-03	2.05E-04		
Hg	2.95E-04	3.49E-04	2.68E-04	2.89E-04	2.52E-04	2.97E-04	2.68E-04	2.87E-04	2.60E-04	2.95E-05	7.09E-05	5.39E-05	8.15E-05	3.54E-04	4.35E-04		
Ni	5.58E-05	7.49E-05	1.03E-04	7.69E-05	4.21E-05	4.40E-05	4.40E-07	1.56E-06	2.38E-06	2.94E-06	2.25E-06	2.69E-06	2.25E-06	4.10E-06	4.20E-06		
Se	2.25E-06	2.98E-06	2.72E-06														
Ag	1.41E-05	1.61E-05	8.64E-05	2.36E-05	5.03E-05	6.37E-06	8.26E-06	3.18E-05	2.16E-05	3.32E-04	1.12E-04	2.59E-05	3.35E-05	4.53E-05	4.45E-05		
Sulfate	6.19E-04	2.54E-03	5.71E-04	5.56E-06	1.06E-04	1.86E-04	2.02E-05	1.76E-05	1.88E-05	1.88E-05	1.76E-05	1.90E-05	1.90E-05	2.01E-05	2.27E-06		
Tl	1.90E-05	2.51E-05	2.29E-05	2.36E-05	5.90E-06												
V	1.02E-06	1.85E-06	1.77E-06	2.32E-04	1.36E-03	2.99E-03	1.77E-06	1.76E-07	9.60E-07	7.60E-07	7.60E-07	7.60E-07	7.60E-07	7.60E-07	7.80E-06		
Zn	3.99E-03	5.75E-03	2.99E-03	4.25E-04	8.54E-05	2.58E-04	2.58E-04	2.32E-04	2.32E-04	1.36E-04	3.81E-04	9.99E-04	4.12E-04	3.32E-04	4.45E-05		
Chloride	1.53E-04	9.60E-06	7.60E-04	1.23E-04	1.00E-04	1.23E-04	1.00E-04	7.32E-05	4.75E-05	4.39E-05	4.75E-05	6.01E-05	5.48E-05	6.01E-05	5.03E-04		
Na	1.64E-04	2.71E-04	1.09E-03	1.36E-04	1.36E-03	1.36E-03	1.36E-03	3.47E-04	2.02E-04	1.81E-04	3.23E-04	4.68E-04	1.39E-04	1.39E-04	1.28E-03		
K	1.69E-04	2.43E-04	1.36E-03	5.33E-04	5.33E-04	5.33E-04	5.33E-04	2.82E-04	2.82E-04	1.21E-04	1.73E-04	2.58E-04	1.39E-04	1.39E-04	1.03E-02		
B	1.51E-05	2.71E-05	6.61E-05	6.25E-06	3.10E-06	1.48E-06	1.48E-06	6.25E-06	3.10E-06	4.23E-06	5.57E-06	6.20E-06	8.21E-06	4.26E-05	4.73E-05		
Co	1.43E-06	2.19E-06	2.09E-06	2.34E-04	2.34E-04	1.47E-04	1.47E-04	1.34E-04	1.34E-04	1.10E-06	1.39E-06	7.40E-07	1.80E-06	4.20E-06	5.80E-06		
Cu	5.57E-05	7.90E-05	2.34E-04	2.17E-05	2.03E-05	9.34E-06	5.69E-06	9.34E-06	9.34E-06	4.30E-05	4.88E-05	3.32E-05	4.03E-05	3.28E-04	4.31E-04		
Sn	3.96E-06	1.00E-05	7.25E-06	2.65E-06	2.92E-06	2.00E-05	1.00E-05										
Bromide	2.00E-06	3.67E-05															
Nitrate	4.00E-06	5.00E-08															
Nitrite	3.00E-06	7.11E-06															
Phosphate	6.60E-04	5.10E-04	1.50E-04	3.40E-04	3.10E-04	2.00E-04	2.50E-04	2.11E-05									

Table 5. (continued).

Constituent	Tank V-1					Tank V-2					Tank V-3					Tank V-4					Tank V-5					
	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	
Units = Weight Fraction																										
chloroform	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
1,2-dichloroethane	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				2.50E-04	2.50E-04									
2-butanone	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				7.50E-04	7.50E-04									
carbon tetrachloride	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
bromodichloromethane	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
1,2-dichloropropane	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				2.50E-04	2.50E-04									
cis-1,3-dichloropropylene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
dibromochloromethane	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
1,1,2-trichloroethane	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
benzene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				2.50E-04	2.50E-04									
trans-1,3-dichloropropylene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				5.00E-04	5.00E-04									
bromoform	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
4-methyl-2-pentanone	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				2.50E-04	2.50E-04									
2-hexanone	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				5.00E-04	5.00E-04									
1,1,2,2-tetrachloroethane	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
toluene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				2.50E-04	2.50E-04									
chlorobenzene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
ethylbenzene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
styrene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				2.50E-04	2.50E-04									
cis-1,2-dichloroethylene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.10E-04	1.10E-04									
xylene	2.20E-06	9.10E-07				6.00E-07	6.80E-07				6.30E-07	6.00E-07				1.20E-04	1.20E-04									
2-methylnaphthalene	2.70E-04	2.40E-04				7.60E-06	2.10E-05				2.60E-05	5.70E-05				3.20E-05	1.50E-05									
1,2-dichlorobenzene	2.70E-04	2.40E-04				7.60E-05	2.60E-04				3.00E-05	2.40E-05				3.50E-04	2.80E-04									
naphthalene	2.70E-04	2.40E-04				7.60E-05	2.60E-04				3.00E-05	2.20E-05				4.40E-05	3.80E-05									
bis(2-ethylhexyl)phthalate	1.70E-02	1.40E-02				3.60E-03	1.20E-02				5.90E-03	7.00E-03				1.10E-03	9.50E-04									
1,2,4-trichlorobenzene	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.10E-02	1.50E-03				3.20E-05	2.60E-05									
1,3-dichlorobenzene	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				1.60E-05	1.30E-05									
1,4-dichlorobenzene	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				9.00E-05	7.30E-05									
2,4-dimethylphenol	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				2.70E-04	2.60E-04									
2-methylphenol	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				4.90E-04	5.00E-04									
4-methylphenol	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				2.60E-04	2.60E-04									
di-n-butylphthalate	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				1.50E-05	1.30E-05									
phenanthrene	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04				2.10E-05	1.90E-05									
phenol	2.70E-04	2.40E-04				7.60E-05	2.60E-04				1.70E-04	1.90E-04	</													

Table 5. (continued).

Constituent	Tank V-1					Tank V-2					Tank V-3					Tank V-4				
	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Data pt #3	Data pt #4	Data pt #5
Units = Weight Fraction																				
4-bromophenyl-phenyl ether	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
4-chloro-3-methylphenol	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
4-chloroaniline	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
4-chlorophenyl-phenyl ether	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
4-nitroaniline	1.40E-03	1.20E-03	3.80E-04	1.30E-03	8.20E-04	9.20E-04	8.70E-04	9.40E-04	1.10E-03	8.70E-04	9.40E-04	1.10E-03	8.90E-04	1.30E-03	8.70E-04	7.70E-04	6.70E-04	6.70E-04	6.70E-04	
4-nitrophenol	1.40E-03	1.20E-03	3.80E-04	1.30E-03	8.20E-04	9.20E-04	8.70E-04	9.40E-04	1.10E-03	8.70E-04	9.40E-04	1.10E-03	8.90E-04	1.30E-03	8.90E-04	7.70E-04	6.70E-04	6.70E-04	6.70E-04	
acenaphthene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
acenaphthylene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
anthracene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
benzo(a)anthracene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
benzo(a)pyrene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
benzo(b)fluoranthene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
benzo(g,h,i)perylene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
benzo(k)fluoranthene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
benzoic acid	1.40E-03	1.20E-03	3.80E-04	1.30E-03	8.20E-04	9.20E-04	8.70E-04	9.40E-04	1.10E-03	8.70E-04	9.40E-04	1.10E-03	8.90E-04	1.30E-03	8.90E-04	7.70E-04	6.70E-04	6.70E-04	6.70E-04	
benzyl alcohol	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
butylbenzylphthalate	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
carbazole	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
chrysene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
di-n-octylphthalate	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
dibenz(a,h)anthracene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
dibenzofuran	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
diethylphthalate	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
dimethylphthalate	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
Fluoranthene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04	1.80E-04	1.70E-04	1.90E-04	2.30E-04	1.70E-04	1.70E-04	1.00E-04	2.70E-04	1.80E-04	1.50E-04	1.50E-04	1.30E-04	1.30E-04	1.30E-04	
fluorene	2.70E-04	2.40E-04	7.60E-05	2.60E-04	1.60E-04															

Table 5. (continued).

Constituent	Data pt #1	Data pt #2	Tank V-1	Data pt #3	Data pt #4	Data pt #5	Data pt #1	Data pt #2	Tank V-2	Data pt #3	Data pt #4	Data pt #5	Tank V-3	Data pt #1	Data pt #2	Tank V-9	Data pt #1	Data pt #2
Units = nCi/g																		
Pu-238	2.61E+01	2.62E+01	2.37E+01	8.59E+00	1.07E+01	5.69E+00	4.44E+00	1.39E+01	1.53E+01	1.46E+01	1.18E+01	1.42E+01	1.08E+01	1.15E+01	2.86E+01	2.86E+01	2.86E+01	
Pu-239/240	1.08E+01	1.12E+01	1.14E+01	4.60E+00	5.45E+00	8.26E+00	7.50E+00	6.15E+00	4.73E+00	1.00E+01	7.44E+00	5.37E+00	6.84E+00	4.81E+00	7.38E+00	7.18E+00	7.18E+00	
Am-241	2.81E+01	3.28E+01	2.52E+01	9.24E+00	1.17E+01	3.52E+00	2.68E+00	2.50E+00	1.23E+00	1.15E+01	7.66E+00	4.84E+00	6.18E+00	5.62E+00	4.30E+00	5.70E+00	5.70E+00	
Cm-242	1.10E-01	1.12E-01	9.80E-02	1.52E-02	3.90E-02	3.00E-03	2.00E-03	9.50E-03	3.00E-03	1.99E-02	1.32E-02	7.54E-02	4.78E-02	4.78E-02	4.53E-01	7.04E-01	7.04E-01	
Cm-243/244	8.40E+00	9.63E+00	7.26E+00	2.79E+00	3.47E+00	1.60E-01	1.26E-01	1.17E-01	2.44E-01	3.69E+00	2.07E+00	1.14E+00	1.59E+00	1.57E+00	4.53E-01	4.53E-01	4.53E-01	
Np-237	2.99E-02	2.79E-02	3.94E-02	1.47E-02	3.35E-02	9.20E-03	3.80E-02	2.40E-02	2.38E-02	2.40E-02	2.59E-02	2.00E-02	2.10E-02	5.75E-02	2.70E-02	3.30E-02	3.30E-02	
U-233/234	2.51E+00	1.76E+00	1.04E+01	7.27E+00	4.33E+00	3.79E+00	2.66E+00	3.15E+00	3.35E+00	1.38E+00	1.11E+00	2.43E+00	2.18E+00	4.06E+00	8.02E+00	1.34E+01	1.34E+01	
U-235	7.80E-02	5.80E-02	3.16E-01	2.14E-01	1.30E-01	1.13E-01	8.10E-02	1.00E-01	1.02E-01	5.00E-02	3.80E-02	7.90E-02	6.90E-02	1.28E-01	2.55E-01	4.50E-01	4.50E-01	
U-238	1.14E-01	6.50E-02	1.06E-01	8.10E-02	6.70E-02	1.31E-01	5.10E-02	9.70E-02	7.50E-02	6.50E-02	5.10E-02	7.90E-02	6.10E-02	8.50E-02	7.80E-02	8.25E-02	8.25E-02	
Sr-90	4.89E+03	4.04E+03	1.43E+04	6.75E+03	8.56E+03	1.65E+04	1.15E+04	1.07E+04	6.21E+03	1.02E+04	2.32E+04	4.45E+04	2.40E+04	5.74E+03	7.07E+03	7.07E+03	7.07E+03	
Ag-108	1.88E+00	6.31E-01	1.32E+00	1.01E+00	6.91E-01	2.08E+00	7.60E-01	4.50E-01	7.60E-01	4.13E-01	1.01E+00	1.36E+00	1.19E+00	7.77E-01	7.77E-01	7.77E-01	7.77E-01	
Ag-110	3.47E+00	1.05E+00	1.95E+00	1.34E+00	3.92E+00	3.91E+00	7.94E-01	7.60E-01	7.60E-01	1.91E+00	2.61E+00	2.24E+00	1.03E+00	2.24E+00	1.03E+00	1.03E+00	1.03E+00	
Ce-144	1.84E+01	6.82E+00	2.18E+01	1.03E+01	7.19E+00	2.07E+01	4.96E+00	4.89E+00	4.89E+00	7.47E+00	4.55E+00	4.55E+00	1.45E+01	1.25E+01	2.56E+01	1.25E+01	1.25E+01	
Co-58	3.70E+00	1.22E+00	4.37E+00	1.20E+00	8.25E-01	3.73E+00	9.00E-01	6.97E-01	8.89E-01	6.97E-01	8.24E-01	1.76E+00	1.62E+00	1.86E+00	2.35E+00	2.35E+00	2.35E+00	
Co-60	4.46E+02	1.51E+02	3.68E+02	1.84E+02	6.70E+01	7.05E+02	1.56E+02	1.38E+02	7.58E+01	1.38E+02	1.56E+02	1.38E+02	1.84E+01	2.23E+02	8.05E+01	1.16E+03	7.26E+02	
Cs-134	2.90E+00	2.16E+00	1.49E+00	5.00E-01	7.26E-01	1.27E+00	3.16E-01	3.17E-01	2.64E+00	2.37E+00	5.81E-01	8.97E-01	1.09E+00	1.09E+00	1.09E+00	1.09E+00	1.09E+00	
Cs-137	7.26E+03	5.91E+03	1.58E+04	9.96E+03	5.10E+03	1.41E+04	6.33E+03	5.66E+03	4.87E+03	6.81E+03	7.45E+03	8.05E+03	6.63E+03	9.05E+03	4.81E+03	6.37E+03	6.37E+03	
Eu-152	4.54E+01	5.29E+01	3.73E+01	1.52E+01	2.56E+01	4.86E+01	2.95E+01	3.03E+00	9.93E+00	2.95E+00	3.03E+00	2.84E+01	2.93E+01	2.93E+01	1.25E+01	0.00E+00	0.00E+00	
Eu-154	6.43E+01	7.12E+01	5.34E+01	2.03E+01	2.82E+01	3.34E+01	2.44E+01	2.02E+01	1.46E+01	3.79E+01	3.79E+01	3.21E+02	2.28E+02	2.23E+02	8.05E+01	1.16E+03	7.26E+02	
Eu-155	6.78E+00	2.70E+00	6.11E+00	3.77E+00	2.63E+00	7.61E+00	2.58E+00	2.87E+00	2.93E+00	2.64E+00	2.37E+00	2.90E-01	2.90E-01	5.81E-01	5.81E-01	5.81E-01		
Mn-54	1.38E+00	4.37E-01	1.51E+00	4.41E-01	2.82E-01	1.75E+01	1.28E+00	8.95E-01	3.89E+00	9.72E-01	5.54E-01	2.94E-01	6.35E-01	5.72E-01	6.78E-01	8.15E-01		
Nb-95	3.95E+00	1.30E+00	1.75E+01	1.28E+00	8.95E-01	3.36E-01	3.81E-01	3.40E+01	1.38E+01	3.35E-01	3.32E-01	2.99E-01	2.94E-01	2.94E-01	4.72E+00	5.42E+00	5.42E+00	
Ra-226	8.49E-01	3.32E-01	1.12E+00	3.81E-01	3.36E-01	8.49E+00	8.93E+00	2.41E-01	2.57E-01	3.73E-01	2.20E-01	4.50E-01	5.23E-01	5.12E+00	8.26E+00	8.26E+00	8.26E+00	
Ru-103	2.47E+01	1.02E+01	3.40E+01	1.38E+01	1.06E+01	2.74E+01	6.96E+00	6.76E+00	6.76E+00	6.76E+00	6.76E+00	6.98E+00	6.98E+00	6.90E+00	1.37E+01	1.93E+01	1.93E+01	
Ru-106	2.29E+01	7.47E+00	2.42E+01	1.24E+01	8.58E+00	2.54E+01	5.44E+00	5.36E+00	5.36E+00	5.36E+00	5.36E+00	8.86E+00	4.94E+00	4.94E+00	1.24E+01	1.68E+01	1.79E+01	
Sb-125	8.229E+00	3.43E+00	1.09E+01	4.68E+00	3.21E+00	9.36E+00	3.44											

Table 6. The individual 95% UCL concentrations for use in re-baselining the source terms.

Constituent	TANK V-1			TANK V-2			TANK V-3			V9 Statistics for a Normal Distribution, (mg/kg)			Value for V9, (mg/kg)
	Avg	Standard Error	95% UCL (mg/kg)	Avg	Standard Error	95% UCL (mg/kg)	Avg	Standard Error	95% UCL (mg/kg)	Avg	Sy	H95	
Al	1.68E+03	5.04E+02	2.52E+03	3.85E+03	1.16E+03	5.77E+03	3.23E+03	9.70E+02	4.84E+03	1.23E+03	3.68E+02	1.84E+03	N/A
Ca	5.60E+03	1.68E+03	8.39E+03	7.70E+03	2.31E+03	1.15E+04	8.08E+03	2.42E+03	1.21E+04	2.99E+03	8.98E+02	4.48E+03	N/A
Cr	1.68E+03	5.04E+02	2.52E+03	3.85E+03	1.16E+03	5.77E+03	3.23E+02	9.70E+01	4.84E+02	8.19E+02	2.46E+02	1.23E+03	N/A
Fe	8.40E+03	2.52E+03	1.26E+04	1.93E+04	5.78E+03	2.88E+04	2.02E+04	6.06E+03	3.03E+04	6.70E+03	2.01E+03	1.00E+04	N/A
Mg	8.40E+03	2.52E+03	1.26E+04	7.70E+03	2.31E+03	1.15E+04	1.21E+04	3.64E+03	1.82E+04	3.95E+03	1.19E+03	5.92E+03	N/A
Mn	2.24E+03	6.72E+02	3.36E+03	7.70E+03	2.31E+03	1.15E+04	4.04E+03	1.21E+03	6.05E+03	1.96E+03	5.87E+02	2.93E+03	N/A
Si	6.72E+04	2.02E+04	1.01E+05	7.70E+04	2.31E+04	1.15E+05	7.68E+04	2.30E+04	1.15E+05	3.09E+04	9.28E+03	4.63E+04	N/A
P	3.08E+04	9.24E+03	4.61E+04	6.62E+04	1.39E+04	6.92E+04	5.25E+04	1.58E+04	7.87E+04	1.81E+04	5.44E+03	2.72E+04	N/A
Sb	5.01E+00	1.12E+00	8.27E+00	4.18E+00	9.95E-01	1.05E+01	2.36E+00	9.95E-01	4.70E+00	1.43E+01	7.90E+00	6.42E+01	2.48E+00
As	2.91E+00	5.61E-01	4.55E+00	2.73E+00	9.70E-01	8.85E+00	2.05E+00	9.70E-01	4.33E+00	3.75E+00	1.90E+00	1.57E+01	3.94E+00
Ba	4.17E+01	1.66E+01	9.02E+01	2.96E+01	7.69E+00	7.81E+01	2.80E+01	7.69E+00	4.61E+01	3.74E+02	1.42E+02	1.27E+03	5.58E+07
Be	8.08E+00	4.81E+00	2.21E+01	3.29E+00	1.10E+00	1.02E+01	3.69E+00	1.10E+00	6.28E+00	2.52E+01	5.50E-01	2.70E+00	3.09E-02
Cd	1.96E+01	6.82E+00	3.95E+01	1.77E+01	3.91E+00	4.24E+01	1.24E+01	3.91E+00	2.16E+01	2.67E+01	4.20E+00	5.32E+01	3.27E+00
Fluoride	5.00E+00	1.44E+00	8.08E+00	5.00E+00	1.44E+00	8.40E+00	5.00E+00	1.44E+00	8.40E+00	6.58E+00	8.30E-01	1.18E+01	1.79E-01
Pb	2.45E+02	4.10E+01	3.65E+02	2.39E+02	7.10E+01	6.87E+02	1.75E+02	7.10E+01	3.42E+02	5.66E+02	2.60E+01	7.30E+02	6.92E+02
Hg	3.04E+02	2.38E+01	3.74E+02	2.71E+02	1.85E+01	3.87E+02	2.78E+02	1.85E+01	3.22E+02	2.08E+03	3.00E+01	2.27E+03	2.19E+03
Ni	7.81E+01	1.38E+01	1.18E+02	5.95E+01	1.74E+01	5.89E+02	1.69E+02	5.89E+01	1.74E+01	9.99E+01	3.95E+02	4.05E+01	5.97E+00
Se	2.65E+00	1.49E+00	7.00E+00	1.00E+00	5.60E-01	4.54E+00	2.35E+00	5.60E-01	3.67E+00	4.15E+00	2.10E+00	1.70E-02	2.56E+00
Ag	3.89E+01	2.38E+01	1.08E+02	3.70E+01	1.33E+01	1.21E+02	1.70E+01	1.33E+01	4.84E+01	6.52E+02	5.50E+00	6.71E+02	6.86E+02
Sulfate	8.15E+02	4.66E+02	1.81E+03	7.94E+01	4.19E+01	1.78E+02	1.26E+02	4.19E+01	2.24E+02	4.49E+01	4.00E+01	4.74E+01	2.59E+00
Tl	2.23E+01	1.26E+01	5.90E+01	2.12E+01	1.18E+01	9.57E+01	1.47E+01	1.18E+01	4.25E+01	6.85E+01	9.50E-01	1.46E-01	4.20E+00
V	1.55E+00	2.64E-01	2.32E+00	8.60E-01	4.80E-01	3.89E+00	1.04E+00	4.80E-01	2.16E+00	6.10E+00	7.00E-01	1.05E+01	4.49E+00
Zn	4.24E+03	8.06E+02	6.60E+03	3.29E+02	9.67E+01	9.39E+02	6.13E+02	9.67E+01	8.40E+02	1.75E+03	4.00E+01	7.47E+00	3.23E-02
Chloride	2.29E+02	1.35E+02	5.17E+02	7.52E+01	2.13E+01	1.25E+02	5.87E+01	2.13E+01	1.09E+02	4.93E+02	1.00E+01	5.56E+02	2.87E-02
Na	5.07E+02	2.91E+02	1.36E+03	2.75E+02	7.28E+01	7.34E+02	2.60E+02	7.28E+01	4.31E+02	1.62E+03	3.35E+02	3.73E+03	7.53E+00
K	5.89E+02	3.84E+02	1.71E+03	4.07E+02	1.26E+03	1.73E+02	1.20E+03	1.73E+02	1.26E+02	4.68E+02	1.80E+01	1.94E+04	6.92E+04
B	3.61E+01	1.54E+01	8.10E+01	4.68E+00	1.58E+00	1.46E+01	6.05E+00	1.58E+00	9.76E+00	4.50E+01	3.80E+00	4.74E+01	2.52E+00
Co	1.90E+00	2.38E-01	2.60E+00	1.25E+00	2.30E-01	2.70E+00	1.26E+00	2.30E-01	1.80E+00	5.00E+00	8.00E-01	1.28E+01	1.90E+01
Cu	1.23E+02	5.59E+01	2.86E+02	1.40E+02	6.65E+00	1.82E+02	4.13E-01	6.65E+00	5.70E+01	1.72E+03	5.15E+01	7.05E+01	5.70E+01
Sn	1.78E+01	3.28E+00	2.73E+01	7.52E+00	1.83E+00	1.90E+01	8.09E+00	1.83E+00	1.24E+01	3.15E+01	1.90E+00	3.45E+00	8.54E-02
Bromide	5.36E+00	1.42E+00	8.38E+00	7.81E+00	2.20E+00	1.30E+01	1.00E+01	2.20E+00	1.52E+01	1.23E+01	0.00E+00	2.51E+01	2.60E+00
Nitrate	2.00E+00	5.77E-01	3.23E+00	2.00E+00	5.77E-01	3.36E+00	2.00E+00	5.77E-01	3.36E+00	3.56E+01	1.10E+01	4.25E+00	4.03E+01
Nitrite	4.00E+00	1.15E+00	6.46E+00	4.00E+00	1.15E+00	6.72E+00	4.00E+00	1.15E+00	6.72E+00	3.80E+02	5.13E+00	5.04E+00	5.04E+03
Phosphate	1.02E+01	4.71E+00	2.02E+01	1.62E+01	2.15E+00	2.12E+01	3.00E+00	2.15E+00	8.06E+00	9.45E-01	1.45E-01	8.65E-02	2.71E+00
Aroclor-1260	1.10E+02	2.45E+01	1.63E+02	8.37E+01	9.84E+00	1.05E+02	1.25E+02	9.38E+00	1.47E+02	1.20E+02	1.05E+01	4.78E+00	1.23E+01
TCE	1.20E+01	8.17E+01	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	6.15E-01	4.00E+03	4.33E+04	4.37E-02	2.84E+00
PCE	1.40E+03	4.00E+02	3.93E+03	4.75E+02	3.50E+01	6.96E+02	4.55E+02	3.50E+01	6.76E+02	5.30E+02	7.00E+01	9.72E+02	6.26E+00
chloromethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	6.95E+01	1.05E+01	4.23E+00	2.15E-01
bromomethane	1.56E+00	1.10E+00	8.										

Table 6. (continued).

Constituent	TANK V-1			TANK V-2			TANK V-3			V9 Statistics for a Normal Distribution, (mg/kg)			V9 Statistics for a lognormal Distribution, (mg/kg)			Value for V9, (mg/kg)		
	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)			
1,1-dichloroethylene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	6.00E+01	4.99E+02	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
1,1-dichloroethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	5.00E+01	2.50E+00	3.91E+00	0.00E+00	2.40E+00	5.00E+01	2.08E+02		
trans-1,2-dichloroethylene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	8.80E+01	4.40E+01	3.66E+02	0.00E+00	2.40E+00	8.80E+01	3.66E+02		
chloroform	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
1,2-dichloroethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	2.50E+02	1.25E+02	1.04E+03	5.52E+00	0.00E+00	2.40E+00	2.50E+02	1.04E+03	
2-butanone	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	7.50E+02	3.75E+02	3.12E+03	6.62E+00	0.00E+00	2.40E+00	7.50E+02	3.12E+03	
carbon tetrachloride	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
bromodichloromethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
1,2-dichloropropane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	2.50E+02	1.25E+02	1.04E+03	5.52E+00	0.00E+00	2.40E+00	2.50E+02	1.04E+03	
cis-1,3-dichloropropylene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
dibromochloromethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
1,1,2-trichloroethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
benzene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	2.50E+02	1.25E+02	1.04E+03	5.52E+00	0.00E+00	2.40E+00	2.50E+02	1.04E+03	
trans-1,3-dichloropropylene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
bromoform	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
4-methyl-2-pentanone	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
2-hexanone	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
1,1,2,2-tetrachloroethane	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
toluene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
chlorobenzene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
ethylbenzene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
styrene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
cis-1,2-dichloroethylene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
xylene	1.56E+00	1.10E+00	8.50E+00	6.40E-01	3.40E-01	2.79E+00	6.15E-01	3.40E-01	2.79E+00	1.20E+02	6.00E+01	4.79E+00	0.00E+00	2.40E+00	1.20E+02	4.99E+02		
2-methylnaphthalene	3.16E+01	1.63E+01	6.64E+01	1.40E+01	3.56E+00	2.23E+01	7.36E+00	1.93E+00	1.73E+01	4.41E+01	2.76E+00	2.76E+00	1.20E+02	6.00E+01	4.99E+02	1.20E+02		
1,2-dichlorobenzene	5.63E+01	2.18E+01	1.03E+02	2.46E+01	1.49E+01	5.97E+01	1.04E+01	3.50E+00	1.86E+01	3.20E+01	1.47E+01	1.32E+02	1.04E+03	5.52E+00	0.00E+00	2.50E+02	1.04E+03	
naphthalene	5.63E+01	2.18E+01	1.03E+02	2.46E+01	1.49E+01	5.72E+01	9.95E+01	7.27E+01	3.15E+01	1.47E+02	1.72E+01	1.26E+00	2.50E+02	1.04E+03	5.52E+00	0.00E+00	2.50E+02	1.04E+03
bis(2-ethylhexyl)phthalate	2.94E+03	7.01E+02	4.44E+03	2.02E+03	8.91E+02	4.12E+03	4.24E+03	3.64E+02	5.10E+03	4.31E+02	1.25E+02	1.04E+03	5.52E+00	0.00E+00	2.50E+02	1.04E+03	5.52E+00	
1,2,4-trichlorobenzene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	7.27E+01	3.15E+01	1.47E+02	1.47E+02	1.22E+01	1.47E+01	1.						

Table 6. (continued).

Constituent	TANK V-1			TANK V-2			TANK V-3			V9 Statistics for a Normal Distribution, (mg/kg)			V9 Statistics for a lognormal Distribution, (mg/kg)			Value for V9, (mg/kg)	
	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)	Avg (mg/kg)	Standard Error (mg/kg)	95% UCL (mg/kg)		
2-nitroaniline	2.86E+02	1.13E+02	5.27E+02	3.69E+02	1.22E+02	6.56E+02	3.60E+02	1.52E+02	7.16E+02	3.02E+02	1.62E+02	1.32E+03	5.71E+03	9.84E+02	3.50E+00	4.28E+02	1.32E+03
2-nitrophenol	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
3,3'-dichlorobenzidine	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
3-nitroaniline	2.86E+02	1.13E+02	5.27E+02	3.69E+02	1.22E+02	6.56E+02	3.60E+02	1.52E+02	7.16E+02	3.02E+02	1.62E+02	1.32E+03	5.71E+03	9.84E+02	3.50E+00	4.28E+02	1.32E+03
4,6-dinitro-2-methylphenol	2.86E+02	1.13E+02	5.27E+02	3.69E+02	1.22E+02	6.56E+02	3.60E+02	1.52E+02	7.16E+02	3.02E+02	1.62E+02	1.32E+03	5.71E+03	9.84E+02	3.50E+00	4.28E+02	1.32E+03
4-bromophenyl-phenyl ether	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
4-chlorophenyl-phenyl ether	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
4-nitroaniline	2.86E+02	1.13E+02	5.27E+02	3.69E+02	1.22E+02	6.56E+02	3.60E+02	1.52E+02	7.16E+02	3.02E+02	1.62E+02	1.32E+03	5.71E+03	9.84E+02	3.50E+00	4.28E+02	1.32E+03
4-nitrophenol	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
acenaphthene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
acenaphthylene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
anthracene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
benzo(a)anthracene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
benzo(k)fluoranthene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
benzoic acid	2.86E+02	1.13E+02	5.27E+02	3.69E+02	1.22E+02	6.56E+02	3.60E+02	1.52E+02	7.16E+02	3.02E+02	1.62E+02	1.32E+03	5.71E+03	9.84E+02	3.50E+00	4.28E+02	1.32E+03
benzyl alcohol	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
butylbenzylphthalate	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
carbozole	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
chrysene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
di-n-octylphthalate	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
dibenz(a,h)anthracene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
dibenzofuran	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
diethylphthalate	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
dimethylphthalate	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
fluoranthene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
hexachlorobenzene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
hexachlorobutadiene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01	2.58E+02	4.07E+00	1.01E-01	3.54E+00	8.43E+01	2.58E+02
hexachlorocyclopentadiene	5.63E+01	2.18E+01	1.03E+02	7.41E+01	2.56E+01	1.34E+02	7.27E+01	3.15E+01	1.47E+02	5.88E+01	3.15E+01</						

Table 6. (continued).

Table 7. The re-baselined data representation of the V-Tank data.

Constituent	Tank V-1	95% UCL	Tank V-2	95% UCL	Tank V-3	95% UCL	Tank V-9	95% UCL	Overall (kg)	NEW V-Tank Source Term (mg/kg)	OLD V-Tank Source Term (mg/kg)	V-Tank Source Term (mg/kg)	STATUS	V-Tank Mass Source Term (kg)
	(mg/kg)	(kg)	(mg/kg)	(mg/kg)	(mg/kg)									
Al	2.52E+03	5.77E+03	4.84E+03	1.84E+03	2.94E+01	6.40E+02	6.19E+02	6.40E+02	6.40E+02	6.40E+02	6.40E+02	6.40E+02	2.94E+01	2.94E+01
Ca	8.39E+03	1.15E+04	1.21E+04	4.84E+02	1.23E+03	1.78E+01	1.58E+03	1.56E+03	1.58E+03	1.58E+03	1.58E+03	1.58E+03	7.24E+01	7.24E+01
Cr	2.52E+03	5.77E+03	4.84E+02	3.03E+04	1.00E+04	1.63E+02	3.87E+02	3.93E+02	3.93E+02	3.93E+02	3.93E+02	3.93E+02	3.55E+03	3.55E+03
Fe	1.26E+04	2.88E+04	3.03E+04	1.82E+04	5.92E+03	9.75E+01	2.12E+03	2.08E+03	2.08E+03	2.08E+03	2.08E+03	2.08E+03	1.63E+02	1.63E+02
Mg	1.26E+04	1.15E+04	1.82E+04	6.05E+03	2.93E+03	4.54E+01	9.90E+02	9.66E+02	9.66E+02	9.66E+02	9.66E+02	9.66E+02	9.75E+01	9.75E+01
Mn	3.36E+03	1.15E+04	6.05E+03	1.15E+05	4.63E+04	7.44E+02	1.62E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	4.54E+01	4.54E+01
Si	1.01E+05	1.15E+05	1.15E+05	6.92E+04	7.87E+04	2.72E+04	4.41E+02	9.62E+03	9.30E+03	9.62E+03	9.62E+03	9.62E+03	7.44E+02	7.44E+02
P	4.61E+04	1.05E+01	4.70E+00	6.42E+01	1.15E-01	2.51E+00	2.51E+00	2.51E+00	2.51E+00	2.51E+00	2.51E+00	2.51E+00	1.15E-01	1.15E-01
Sb	8.27E+00	4.55E+00	8.85E+00	4.33E+00	1.57E+01	5.24E-02	1.14E+00	5.08E-01	1.14E+00	5.08E-01	1.14E+00	1.14E+00	5.24E-02	5.24E-02
As	9.02E+01	7.81E+01	4.61E+01	1.27E+03	1.78E+00	3.89E+01	3.46E+01	3.89E+01	3.46E+01	3.89E+01	3.89E+01	3.89E+01	1.78E+00	1.78E+00
Ba	2.21E+01	1.02E+01	6.28E+00	2.86E+01	1.09E-01	2.37E+00	1.46E+00	2.37E+00	1.46E+00	2.37E+00	1.46E+00	2.37E+00	1.09E-01	1.09E-01
Be	3.95E+01	4.24E+01	2.16E+01	9.67E+01	3.11E-01	6.78E+00	2.90E+00	6.78E+00	2.90E+00	6.78E+00	2.90E+00	6.78E+00	3.11E-01	3.11E-01
Cd	Fluoride	8.08E+00	8.40E+00	8.40E+00	1.56E+01	6.88E-02	1.50E+00	1.52E+01	1.52E+01	1.52E+01	1.52E+01	1.52E+01	6.98E-01	6.98E-01
Pb	3.65E+02	6.87E+02	3.42E+02	7.30E+02	3.58E+00	7.80E+01	4.33E+01	7.80E+01	4.33E+01	7.80E+01	4.33E+01	7.80E+01	3.58E+00	3.58E+00
Hg	3.74E+02	3.87E+02	3.22E+02	2.27E+03	4.66E+00	1.01E+02	8.93E+01	1.01E+02	8.93E+01	1.01E+02	8.93E+01	1.01E+02	4.66E+00	4.66E+00
Ni	1.18E+02	1.69E+02	9.99E+01	7.31E+02	1.57E+00	3.41E+01	1.96E+01	3.41E+01	1.96E+01	3.41E+01	1.96E+01	3.41E+01	1.57E+00	1.57E+00
Se	7.00E+00	4.54E+00	3.67E+00	1.74E+01	4.98E-02	1.09E+00	4.98E-02	1.09E+00	4.98E-02	1.09E+00	4.98E-02	1.09E+00	4.98E-02	4.98E-02
Ag	1.08E+02	1.21E+02	4.84E+01	6.86E+02	1.28E+00	2.80E+01	2.16E+01	2.80E+01	2.16E+01	2.80E+01	2.16E+01	2.80E+01	1.28E+00	1.28E+00
Sulfate	1.81E+03	1.78E+02	2.24E+02	4.74E+01	4.55E+00	9.90E+01	7.49E+01	9.90E+01	7.49E+01	9.90E+01	7.49E+01	9.90E+01	4.55E+00	4.55E+00
Tl	5.90E+01	9.57E+01	4.25E+01	1.90E+01	4.14E-01	9.03E+00	3.41E+00	9.03E+00	3.41E+00	9.03E+00	9.03E+00	9.03E+00	4.14E-01	4.14E-01
V	2.32E+00	3.89E+00	2.16E+00	1.28E+01	3.06E-02	6.66E-02	3.71E-01	6.66E-02	3.71E-01	6.66E-02	3.71E-01	6.66E-02	3.06E-02	3.06E-02
Zn	6.60E+03	9.39E+02	8.40E+02	2.00E+03	1.91E+01	4.16E+02	2.70E+02	4.16E+02	2.70E+02	4.16E+02	4.16E+02	4.16E+02	1.91E+01	1.91E+01
Chloride	5.17E+02	1.25E+02	1.09E+02	5.56E+02	2.12E+00	4.62E+01	1.32E+02	4.62E+01	1.32E+02	4.62E+01	1.32E+02	4.62E+01	6.05E+00	6.05E+00
Na	1.36E+03	7.34E+02	4.31E+02	1.56E+04	2.17E+01	4.72E+02	3.20E+02	4.72E+02	3.20E+02	4.72E+02	4.72E+02	4.72E+02	2.17E+01	2.17E+01
K	1.71E+03	1.20E+03	4.68E+02	6.92E+04	8.04E+01	1.75E+03	5.02E+02	1.75E+03	5.02E+02	1.75E+03	5.02E+02	1.75E+03	8.04E+01	8.04E+01
B	8.10E+01	1.46E+01	9.76E+00	5.98E+01	2.76E-01	6.02E+00	1.37E+01	6.02E+00	1.37E+01	6.02E+00	1.37E+01	6.02E+00	6.30E-01	6.30E-01
Co	2.60E+00	2.70E+00	1.80E+00	1.89E+01	1.89E+01	3.46E-02	7.55E-01	3.62E-01	7.55E-01	3.62E-01	7.55E-01	7.55E-01	3.46E-02	3.46E-02
Cu	2.86E+02	1.82E+02	5.70E+01	1.01E+03	2.12E+00	4.61E+01	2.34E+01	4.61E+01	2.34E+01	4.61E+01	2.34E+01	4.61E+01	2.12E+00	2.12E+00
Sn	2.73E+01	1.90E+01	1.24E+01	4.35E+01	1.66E-01	3.61E+00	3.02E+00	3.61E+00	3.02E+00	3.61E+00	3.61E+00	3.61E+00	1.66E-01	1.66E-01
Bromide	8.38E+00	1.30E+01	1.52E+01	1.23E+01	9.09E-02	2.12E+00	3.61E+00	2.12E+00	3.61E+00	2.12E+00	3.61E+00	3.61E+00	1.65E-01	1.65E-01
Nitrate	3.23E+00	3.36E+00	3.36E+00	4.25E+04	2.17E+01	4.72E+02	3.20E+02	4.72E+02	3.20E+02	4.72E+02	4.72E+02	4.72E+02	2.17E+01	2.17E+01
Nitrite	6.46E+00	6.72E+00	6.72E+00	2.59E+01	2.76E-01	6.92E-02	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00	1.51E+00	5.57E-01	5.57E-01
Phosphate	2.02E+01	2.12E+01	8.06E+00	3.23E+00	1.02E-01	2.22E+00	5.70E+00	2.22E+00	5.70E+00	2.22E+00	5.70E+00	5.70E+00	2.62E-01	2.62E-01
Acrolein-1260	1.63E+02	1.05E+02	1.47E+02	1.94E+02	1.09E+00	2.37E+01	6.62E-02	1.44E+00	1.44E+00	1.44E+00	1.44E+00	1.44E+00	8.71E-02	8.71E-02
TCE	8.17E+01	2.79E+00	2.76E+00	2.54E+05	2.76E+00	5.89E+03	1.09E+03	5.89E+03	1.09E+03	5.89E+03	1.09E+03	5.89E+03	2.70E+02	2.70E+02
PCE	3.93E+03	6.96E+02	6.76E+02	1.35E+03	1.2									

Table 7. (continued).

Constituent	Tank V-1	95%	Tank V-2	95%	Tank V-3	95%	Tank V-9	95%	Overall (kg)	Source Term (mg/kg)	V-Tank Source Term	(mg/kg)	Status	Source Term (kg)
	UCL (mg/kg)													
1,1-dichloroethane	8.50E+00	2.79E+00	2.76E+00	2.08E+02	2.50E-01	5.45E+00	5.16E+00	5.45E+00	2.50E-01	2.50E-01	2.50E-01	2.50E-01	4.19E-01	4.19E-01
trans-1,2-dichloroethylene	8.50E+00	2.79E+00	2.76E+00	3.66E+02	4.19E-01	9.12E+00	9.12E+00	9.12E+00	4.19E-01	4.19E-01	4.19E-01	4.19E-01	5.60E-01	5.60E-01
chloroform	8.50E+00	2.79E+00	2.76E+00	4.99E+02	5.60E-01	1.22E+01	1.21E+01	1.22E+01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
1,2-dichloroethane	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.47E+01	2.52E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
2-butane	8.50E+00	2.79E+00	2.76E+00	3.12E+03	3.35E+00	7.30E+01	7.51E+01	7.51E+01	3.45E+00	3.45E+00	3.45E+00	3.45E+00	3.45E+00	3.45E+00
carbon tetrachloride	8.50E+00	2.79E+00	2.76E+00	4.99E+02	5.60E-01	1.22E+01	1.21E+01	1.22E+01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
bromodichloromethane	8.50E+00	2.79E+00	2.76E+00	4.99E+02	5.60E-01	1.22E+01	1.22E+01	1.22E+01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
1,2-dichloropropane	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
cis-1,3-dichloropropylene	8.50E+00	2.79E+00	2.76E+00	4.99E+02	5.60E-01	1.22E+01	1.22E+01	1.22E+01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
dibromochloromethane	8.50E+00	2.79E+00	2.76E+00	4.99E+02	5.60E-01	1.22E+01	1.22E+01	1.22E+01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
1,1,2-trichloroethane	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
benzene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
trans-1,3-dichloropropylene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
bromoform	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
4-methyl-2-pentanone	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
2-hexanone	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
1,1,2,2-tetrachloroethane	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
toluene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
chlorobenzene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
ethylbenzene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
styrene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
cis-1,2-dichloroethylene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
xylene	8.50E+00	2.79E+00	2.76E+00	1.04E+03	1.14E+00	2.47E+01	2.51E+01	2.51E+01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
2-methylnaphthalene	6.64E+01	2.23E+01	1.19E+01	5.74E+01	5.60E-01	2.63E-01	2.63E-01	2.63E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
1,2-dichlorobenzene	1.03E+02	5.97E+01	1.86E+01	4.57E+02	5.16E-01	1.12E+01	1.12E+01	1.12E+01	5.16E-01	5.16E-01	5.16E-01	5.16E-01	5.16E-01	5.16E-01
naphthalene	1.03E+02	9.95E+01	1.47E+02	4.99E+02	5.60E-01	1.22E+01	1.22E+01	1.22E+01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01	5.60E-01
bis(2-ethylhexyl)phthalate	4.44E+03	4.12E+03	5.10E+03	6.29E+02	2.96E+01	6.46E+02	6.52E+02	6.52E+02	2.96E+01	2.96E+01	2.96E+01	2.96E+01	2.96E+01	2.96E+01
1,2,4-trichlorobenzene	1.03E+02	1.34E+02	1.47E+02	2.27E+01	8.36E-01	1.82E+01	1.82E+01	1.82E+01	8.36E-01	8.36E-01	8.36E-01	8.36E-01	8.36E-01	8.36E-01
1,3-dichlorobenzene	1.03E+02	1.34E+02	1.47E+02	1.14E+01	8.24E-01	1.80E+01	1.80E+01	1.80E+01	8.24E-01	8.24E-01	8.24E-01	8.24E-01	8.24E-01	8.24E-01
1,4-dichlorobenzene	1.03E+02	1.34E+02	1.47E+02	6.44E+01	8.81E-01	1.92E+01	1.92E+01	1.92E+01	8.81E-01	8.81E-01	8.81E-01	8.81E-01	8.81E-01	8.81E-01
2,4-dimethylphenol	1.03E+02	1.34E+02	1.47E+02	1.25E+02	9.45E-01	2.06E+01	2.06E+01	2.06E+01	9.45E-01	9.45E-01	9.45E-01	9.45E-01	9.45E-01	9.45E-01
2-methylphenol	1.03E+02	1.34E+02	1.47E+02	2.21E+02	1.05E+00	2.28E+01	1.99E+01	1.99E+01	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00
4-methylphphenol	1.03E+02	1.34E+02	1.47E+02	1.09E+02	9.29E-01	1.78E-01	1.69E+01	1.69E+01	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02	1.09E+02
di-n-butylphthalate	1.03E+02	1.34E+02	1.47E+02	8.53E+00	8.21E-01	1.79E+01	1.79E+01	1.79E+01	8.21E-01	8.21E-01	8.21E-01	8.21E-01	8.21E	

Table 7. (continued).

Constituent	Tank V-1	95%	Tank V-2	95%	Tank V-3	95%	Tank V-9	95%	Overall	Source Term	V-Tank Source Term	V-Tank Mass (kg)
	(mg/kg)	(kg)	(mg/kg)	(mg/kg)	(kg)							
3,3'-dichlorobenzidine	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
3-nitroaniline	5.27E+02	6.56E+02	7.16E+02	1.32E+03	5.42E+00	1.18E+02	7.74E+01	1.18E+02	5.42E+00	5.42E+00	1.18E+02	5.42E+00
4,6-dinitro-2-methylphenol	5.27E+02	6.56E+02	7.16E+02	1.32E+03	5.42E+00	1.18E+02	7.74E+01	1.18E+02	5.42E+00	5.42E+00	1.18E+02	5.42E+00
4-bromophenyl-phenyl ether	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
4-chloro-3-methylphenol	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
4-chloroaniline	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
4-chlorophenyl-phenyl ether	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
4-nitroaniline	5.27E+02	6.56E+02	7.16E+02	1.32E+03	5.42E+00	1.18E+02	7.74E+01	1.18E+02	5.42E+00	5.42E+00	1.18E+02	5.42E+00
4-nitrophenol	5.27E+02	6.56E+02	7.16E+02	1.32E+03	5.42E+00	1.18E+02	7.74E+01	1.18E+02	5.42E+00	5.42E+00	1.18E+02	5.42E+00
acenaphthene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
acenaphthylene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
anthracene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
benzo(a)anthracene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
benzo(a)pyrene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
benzo(b)fluoranthene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
benzo(g,h,i)perylene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
benzo(k)fluoranthene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
benzoic acid	5.27E+02	6.56E+02	7.16E+02	1.32E+03	5.42E+00	1.18E+02	7.74E+01	1.18E+02	5.42E+00	5.42E+00	1.18E+02	5.42E+00
benzyl alcohol	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
butylbenzylphthalate	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
carboazole	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
chrysene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
di-n-octylphthalate	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
dibenz(a,h)anthracene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
dibenzofuran	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
diethylphthalate	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
dimethylphthalate	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
fluoranthene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
fluorene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
hexachlorobenzene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
hexachlorobutadiene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
hexachlorocyclopentadiene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
hexachloroethane	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
indeno(1,2,3-cd)pyrene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
isophorone	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
N-nitroso-di-n-propylamine	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
N-nitrosodiphenylamine	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
nitrobenzene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.62E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
pentachlorophenol	5.27E+02	6.56E+02	7.16E+02	1.32E+03	5.42E+00	1.18E+02	7.74E+01	1.18E+02	5.42E+00	5.42E+00	1.18E+02	5.42E+00
pyrene	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.09E+00	2.37E+01	1.55E+01	2.37E+01	1.09E+00	1.09E+00	2.37E+01	5.42E+00
pyridine	1.03E+02	1.34E+02	1.47E+02	2.58E+02	1.							

Table 7. (continued).

Constituent	Tank V-1			95% UCL			95% UCL			95% UCL			95% Tank V-3			95% Tank V-9			95% Overall			NEW V-Tank			OLD V-Tank			V-Tank Source		
	(mg/kg)	(mg/kg)	(mg/kg)	nCi/g	(mg/kg)	nCi/g	nCi/g	(mg/kg)	nCi/g	nCi/g	(mg/kg)	nCi/g	nCi/g	(mg/kg)	nCi/g	nCi/g	(mg/kg)	nCi/g	nCi/g	(kg)	Ci	(mg/kg)	nCi/g	(mg/kg)	nCi/g	(kg)	STATUS	Source Term	Source Term	Source Term
Pu-238	2.73E+01	1.28E+01	1.52E+01	7.40E+01	1.94E-01	2.55E+00	4.24E+00	6.95E-02	1.51E+00	1.12E+00	1.48E+00	1.08E-01	2.36E+00	9.73E-03	6.33E-03	3.38E-02	4.46E-04	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	1.94E-01	
Pu-239/240	1.19E+01	8.49E+00	8.84E+00	7.91E+00	1.41E+01	1.08E-01	1.41E+01	0.00E+00	7.08E+00	7.36E-01	3.81E-04	4.46E-04	9.73E-03	3.92E-01	7.36E-01	8.31E-03	3.81E-04	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02	3.38E-02
Am-241	3.13E+01	3.60E+00	9.67E+00	1.41E+01	1.08E-01	1.48E+00	1.48E+00	1.08E-01	1.41E+01	1.41E+01	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00		
Cm-242	1.17E-01	8.43E-03	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00	7.82E-02	0.00E+00										
Cm-243/244	9.20E+00	2.30E-01	2.96E+00	7.36E-01	5.88E-02	5.42E-02	5.42E-02	8.31E-03	8.31E-03	8.31E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03	5.21E-03		
Np-237	4.84E-02	4.48E-02	5.88E-02	5.88E-02	3.34E+00	3.73E+02	4.29E-01	9.36E+00	9.36E+00	9.36E+00	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01		
U-233/234	8.66E+00	3.79E+00	1.15E-01	1.06E-01	1.60E+00	1.60E+00	1.59E-03	1.59E-03	1.59E-03	1.59E-03	1.57E+02	3.42E+03	2.71E-02	5.87E-02	1.22E-02	3.46E-02	3.42E+03	2.71E-02	5.87E-02	1.22E-02	3.46E-02	1.59E-03	1.57E+02	1.57E+02	1.57E+02	1.57E+02	1.57E+02	1.57E+02		
U-235	2.61E-01	1.29E-01	8.13E-02	8.83E-01	3.59E+04	1.20E+04	1.20E+04	1.20E+04	1.20E+04	1.20E+04	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02	1.19E-02		
U-238	1.08E-01	1.66E+04	1.73E+04	1.73E+04	1.87E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	1.74E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00	3.20E+00		
Sr-90	2.12E+00	2.10E+01	2.10E+01	2.10E+01	3.94E+00	3.88E+00	3.88E+00	3.88E+00	3.88E+00	3.88E+00	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01	2.67E+01		
Ag-108	3.74E+00	3.88E+00	6.13E+02	6.13E+02	1.11E+00	1.11E+00	1.11E+00	1.11E+00	1.11E+00	1.11E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00	3.00E+00		
Ag-110	2.54E+01	4.76E+00	3.94E+02	3.94E+02	2.51E+00	1.11E+00	2.40E+00	2.40E+00	2.40E+00	2.40E+00	0.00E+00	1.55E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Ce-144	2.10E+01	4.76E+00	3.63E+00	3.63E+00	1.29E+04	1.28E+04	8.54E+03	8.54E+03	8.54E+03	8.54E+03	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	1.57E+04	
Co-58	2.51E+00	1.34E+00	1.34E+00	1.34E+00	4.19E+01	4.19E+01	3.58E+01	3.58E+01	3.58E+01	3.58E+01	2.75E+02	2.75E+02	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04	1.66E+04
Co-60	1.22E+00	7.66E+00	7.66E+00	7.66E+00	1.38E+01	3.80E+00	8.00E+00	8.00E+00	8.00E+00	8.00E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00	
Cs-134	1.35E+04	1.23E+01	2.73E+01	2.73E+01	1.70E+00	1.34E+00	1.34E+00	1.34E+00	1.34E+00	1.34E+00	3.03E+01	3.03E+01	3.03E+01	3.03E+01	3.03E+01	3.03E+01	3.03E+01	3.03E+01	3.03E+01	3.03E+01	1.99E-03	1.84E-03	1.84E-03	1.84E-03	1.84E-03	1.84E-03	1.84E-03	1.84E-03	1.84E-03	1.84E-03
Cs-137	4.97E+01	4.19E+01	3.25E+01	3.25E+01	6.88E+01	6.84E+00	5.50E+00	5.50E+00	5.50E+00	5.50E+00	1.06E+00	0.00E+																		

4.2 Inventory of the Remaining Waste

The inventory of source terms for the remaining waste was determined using the mass of VOCs emitted as shown in Table 3 and the mass of VOCs initially present in the V-Tank Waste as shown in Table 7. Mass values from these two tables are used to create Table 8. As can be seen, this material balance resulted in negative masses remaining for specific constituents. TCA and PCE almost certainly remain in the consolidated waste. This data will be adjusted by setting both the TCA and PCE to a remaining mass of 3 kg, and all of the other negative species to 0.5 kg (chloroform, chloromethane, 1,1-dichloroethylene, vinyl chloride, and 1,2 dichloroethane).^e These residual masses are estimates for planning purposes that are expected to provide a reasonable basis for proceeding (or until better information becomes available). From Table 9, these estimated values are used for these seven constituents resulted in an increase to the sum of their masses in the initial waste from 27.9 kg to 78.7 kg. The other VOCs in Table 8 that had positive mass remaining will not be altered in the same manner. Table 10 shows the remaining material for the constituents lost through transfer and sparging. Table 11 shows the total remaining inventory of all constituents as well as the remaining VOCs to be sparged when treatment is re-started.

Table 8. The material balance of initial versus volatized VOC – Unadjusted.

Volatilized VOC	Initial Mass in V-Tank Waste, (kg)	Mass Lost During Processing, (kg)	Mass Remaining in Waste, (kg)
Carbon tetrachloride	0.560	0.269	0.291
Chloroform	0.560	9.05	-8.490
Methylene Chloride	1.164	0.086	1.078
Chloromethane	0.273	4.11	-3.837
Tetrachloroethene	12.227	19.6	-7.373
Trichloroethene	270.468	144	126.468
cis-1,2-Dichloroethene	0.516	0.16	0.356
1,1-Dichloroethene	0.560	3.19	-2.630
Vinyl Chloride	0.560	2.49	-1.930
TCA	13.012	27.9	-14.888
1,1-Dichloroethane	0.250	0.19	0.060
1,2-Dichloroethane	1.155	4.3	-3.145
Chloroethane	1.153	0.1	1.053
Total	302	215	87

e. The TCA and PCE are set to higher estimates than the others since it is anticipated that these species are expected to still be present.

Table 9. Re-establishment of the initial inventory of V-Tank Waste.

Volatilized VOC	Mass Lost During Processing, (kg)	Assumed Mass Still Existing, (kg)	Adjusted Mass in Initial Waste, (kg)
Chloroform	9.05	0.5	9.55
Chloromethane	4.11	0.5	4.61
PCE	19.6	3	22.6
1,1-dichloroethylene	3.19	0.5	3.69
Vinyl chloride	2.49	0.5	2.99
TCA	27.9	3	30.9
1,2-dichloroethane	4.3	0.5	4.8
Totals			79.14

Table 10. The material balance of initial versus volatilized VOC – Adjusted.

Volatilized VOC	Unadjusted Initial Mass in V-Tank Waste, (kg)	Adjusted Initial Mass in V-Tank Waste, (kg)	Mass Lost During Processing, (kg)	Mass Remaining in Waste based on Adjusted Mass, (kg)
Carbon tetrachloride	0.560	0.560	0.269	0.291
Chloroform	0.560	9.550	9.05	0.5
Methylene Chloride	1.164	1.164	0.086	1.078
Chloromethane	0.273	4.610	4.11	0.5
Tetrachloroethene	12.2	22.6	19.6	3.0
Trichloroethene	270	270	144	126
cis-1,2-Dichloroethene	0.516	0.516	0.16	0.356
1,1-Dichloroethene	0.560	3.690	3.19	0.5
Vinyl Chloride	0.560	2.990	2.49	0.5
TCA	13.0	30.9	27.9	3.0
1,1-Dichloroethane	0.250	0.250	0.19	0.060
1,2-Dichloroethane	1.15	4.80	4.30	0.50
Chloroethane	1.15	1.15	0.10	1.05
Total	302	353	216	138

Table 11. Inventory of Remaining Material in the V-Tanks.

Constituent	V-Tank Source Term, (mg/kg)	V-Tank Mass Source Term, (kg)
Al	6.40E+02	2.94E+01
Ca	1.58E+03	7.24E+01
Cr	3.93E+02	1.80E+01
Fe	3.55E+03	1.63E+02
Mg	2.12E+03	9.75E+01
Mn	9.90E+02	4.54E+01
Si	1.62E+04	7.44E+02
P	9.62E+03	4.41E+02
Sb	2.51E+00	1.15E-01
As	1.14E+00	5.24E-02
Ba	3.89E+01	1.78E+00
Be	2.37E+00	1.09E-01
Cd	6.78E+00	3.11E-01
Fluoride	1.52E+01	6.98E-01
Pb	7.80E+01	3.58E+00
Hg	1.01E+02	4.66E+00
Ni	3.41E+01	1.57E+00
Se	1.09E+00	4.98E-02
Ag	2.80E+01	1.28E+00
Sulfate	9.90E+01	4.55E+00
Tl	9.03E+00	4.14E-01
V	6.66E-01	3.06E-02
Zn	4.16E+02	1.91E+01
Chloride	1.32E+02	6.05E+00
Na	4.72E+02	2.17E+01
K	1.75E+03	8.04E+01
B	1.37E+01	6.30E-01
Co	7.55E-01	3.46E-02
Cu	4.61E+01	2.12E+00
Sn	3.61E+00	1.66E-01
Bromide	3.61E+00	1.65E-01
Nitrate	1.90E+00	8.71E-02
Nitrite	1.21E+01	5.57E-01
Phosphate	5.70E+00	2.62E-01
Aroclor-1260	2.37E+01	1.09E+00

Table 11. (continued).

Constituent	V-Tank Source Term, (mg/kg)	V-Tank Mass Source Term, (kg)
TCE	2.76E+03	1.26E+02
PCE	6.54E+01	3.00E+00
chloromethane	1.09E+01	5.00E-01
bromomethane	2.59E+01	1.19E+00
TCA	6.54E+01	3.00E+00
vinyl chloride	1.09E+01	5.00E-01
chloroethane	2.29E+01	1.05E+00
methylene chloride	2.35E+01	1.08E+00
acetone	1.40E+02	6.43E+00
carbon disulfide	2.17E+01	9.97E-01
1,1-dichloroethylene	1.09E+01	5.00E-01
1,1-dichloroethane	1.31E+00	6.03E-02
trans-1,2-dichloroethylene	1.15E+01	5.26E-01
chloroform	1.09E+01	5.00E-01
1,2-dichloroethane	1.09E+01	5.00E-01
2-butanone	7.51E+01	3.45E+00
carbon tetrachloride	6.35E+00	2.91E-01
bromodichloromethane	5.84E+01	2.68E+00
1,2-dichloropropane	2.51E+01	1.15E+00
cis-1,3-dichloropropylene	1.22E+01	5.60E-01
dibromochloromethane	2.17E+01	9.97E-01
1,1,2-trichloroethane	1.22E+01	5.60E-01
benzene	2.51E+01	1.15E+00
trans-1,3-dichloropropylene	2.51E+01	1.15E+00
bromoform	5.01E+01	2.30E+00
4-methyl-2-pentanone	2.17E+01	9.97E-01
2-hexanone	5.01E+01	2.30E+00
1,1,2,2-tetrachloroethane	1.22E+01	5.60E-01
toluene	4.31E+01	1.98E+00
chlorobenzene	1.22E+01	5.60E-01
ethylbenzene	2.17E+01	9.97E-01
styrene	2.51E+01	1.15E+00
cis-1,2-dichloroethylene	7.76E+00	3.56E-01
xylene	2.17E+01	9.97E-01
2-methylnaphthalene	1.16E+01	5.31E-01
1,2-dichlorobenzene	1.77E+01	8.13E-01

Table 11. (continued).

Constituent	V-Tank Source Term, (mg/kg)	V-Tank Mass Source Term, (kg)
naphthalene	1.42E+01	6.52E-01
bis(2-ethylhexyl)phthalate	5.52E+02	2.53E+01
1,2,4-trichlorobenzene	1.60E+02	7.34E+00
1,3-dichlorobenzene	6.52E+01	2.99E+00
1,4-dichlorobenzene	1.92E+01	8.81E-01
2,4-dimethylphenol	2.05E+01	9.40E-01
2-methylphenol	2.30E+01	1.06E+00
4-methylphenol	2.05E+01	9.43E-01
di-n-butylphthalate	1.81E+01	8.33E-01
phenanthrene	1.79E+01	8.23E-01
phenol	1.84E+01	8.46E-01
Total Carbon	1.76E+04	8.06E+02
2,4,5-trichlorophenol	2.77E+03	1.27E+02
2,4,6-trichlorophenol	2.59E+03	1.19E+02
2,4-dichlorophenol	5.82E+01	2.67E+00
2,4-dinitrophenol	5.53E+01	2.54E+00
2,4-dinitrotoluene	4.09E+01	1.88E+00
2,6-dinitrotoluene	4.28E+01	1.96E+00
2-chloronaphthalene	2.37E+01	1.09E+00
2-chlorophenol	2.37E+01	1.09E+00
2-nitroaniline	7.74E+01	3.55E+00
2-nitrophenol	4.09E+01	1.88E+00
3,3'-dichlorobenzidine	5.82E+01	2.67E+00
3-nitroaniline	7.74E+01	3.55E+00
4,6-dinitro-2-methylphenol	8.36E+01	3.84E+00
4-bromophenyl-phenyl ether	7.55E+01	3.46E+00
4-chloro-3-methylphenol	5.82E+01	2.67E+00
4-chloroaniline	2.37E+01	1.09E+00
4-chlorophenyl-phenyl ether	2.37E+01	1.09E+00
4-nitroaniline	7.74E+01	3.55E+00
4-nitrophenol	8.36E+01	3.84E+00
acenaphthene	7.55E+01	3.46E+00
acenaphthylene	5.82E+01	2.67E+00
anthracene	2.37E+01	1.09E+00
benzo(a)anthracene	2.37E+01	1.09E+00
benzo(a)pyrene	2.37E+01	1.09E+00

Table 11. (continued).

Constituent	V-Tank Source Term, (mg/kg)	V-Tank Mass Source Term, (kg)
benzo(b)fluoranthene	2.37E+01	1.09E+00
benzo(g,h,i)perylene	2.37E+01	1.09E+00
benzo(k)fluoranthene	2.37E+01	1.09E+00
benzoic acid	7.74E+01	3.55E+00
benzyl alcohol	4.09E+01	1.88E+00
butylbenzylphthalate	5.82E+01	2.67E+00
carbozole	2.37E+01	1.09E+00
chrysene	2.37E+01	1.09E+00
di-n-octylphthalate	2.37E+01	1.09E+00
dibenz(a,h)anthracene	2.37E+01	1.09E+00
dibenzofuran	2.37E+01	1.09E+00
diethylphthalate	2.37E+01	1.09E+00
dimethylphthalate	2.37E+01	1.09E+00
fluoranthene	2.37E+01	1.09E+00
fluorene	2.37E+01	1.09E+00
hexachlorobenzene	2.37E+01	1.09E+00
hexachlorobutadiene	2.37E+01	1.09E+00
hexachlorocyclopentadiene	2.37E+01	1.09E+00
hexachloroethane	2.37E+01	1.09E+00
indeno(1,2,3-cd)pyrene	2.37E+01	1.09E+00
isophorone	2.37E+01	1.09E+00
N-nitroso-di-n-propylamine	2.37E+01	1.09E+00
N-nitrosodiphenylamine	2.37E+01	1.09E+00
nitrobenzene	2.37E+01	1.09E+00
pentachlorophenol	7.74E+01	3.55E+00
pyrene	4.09E+01	1.88E+00
pyridine	5.82E+01	2.67E+00
bis(2-chloroethoxy)methane	2.37E+01	1.09E+00
bis(2-chloroethyl)ether	2.37E+01	1.09E+00
bis(2-chloroisopropyl)ether	2.37E+01	1.09E+00

Table 11. (continued).

Constituent	V-Tank Source Term, (mg/kg)	V-Tank Mass Source Term, (kg)
	nCi/g	Curies
Pu-238	4.24E+00	1.94E-01
Pu-239/240	1.51E+00	6.95E-02
Am-241	2.36E+00	1.08E-01
Cm-242	9.73E-03	4.46E-04
Cm-243/244	7.36E-01	3.38E-02
Np-237	8.31E-03	3.81E-04
U-233/234	9.36E+00	4.29E-01
U-235	5.87E-02	2.70E-03
U-238	3.46E-02	1.59E-03
Sr-90	3.42E+03	1.57E+02
Ag-108	2.60E-01	1.19E-02
Ag-110	4.88E-01	2.24E-02
Ce-144	3.38E+00	1.55E-01
Co-58	5.12E-01	2.35E-02
Co-60	4.42E+02	2.03E+01
Cs-134	2.84E-01	1.30E-02
Cs-137	1.89E+03	8.66E+01
Eu-152	5.29E+00	2.43E-01
Eu-154	7.15E+00	3.28E-01
Eu-155	8.37E-01	3.84E-02
Mn-54	1.84E-01	8.44E-03
Nb-95	1.19E+00	5.45E-02
Ra-226	7.45E-01	3.42E-02
Ru-103	4.33E+00	1.99E-01
Ru-106	3.58E+00	1.64E-01
Sb-125	1.44E+00	6.62E-02
Zn-65	4.61E-01	2.12E-02
Zr-95	1.06E+00	4.87E-02
I-129	1.84E-02	8.43E-04
Ni-63	2.68E+02	1.23E+01
Tritium	2.78E+01	1.28E+00

5. REFERENCES

DOE/ID-10875, *Comprehensive RD/RA Work Plan for the TAN, WAG 1, OU 1-10, Group 2 Sites*, Rev. 0, March 2, 2001.

EDF-2606, “Review of Analytical Data for a Hazardous Waste Determination for the Contents of the PM-2A Tanks (TSF-26),” Rev. 1, December 2, 2004.

EDF-4775, “Calculated Flammability Limits for the Off-Gas System of the V-Tank Treatment Process,” Rev. 0, February 17, 2005.

EDF-4956, “Design for VOC Control for the TSF-09/18 V-Tank Remedial Action,” Rev. 1, November 22, 2004.

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Appendix A

FTIR Spectra Analysis

Appendix A

FTIR Spectra Analysis

The spectra (2 inlet and 1 exhaust) representing the application of the mobile Fourier Transform Infrared spectrometer (FTIR) unit to the analysis/monitoring of the gas streams generated by the sparging of the tank contents at TAN were reviewed. The following four figures help to summarize all that was found. In short, for the inlet stream going into the granulated activated carbon (GAC) beds, relatively high concentrations of trichloroethene (TCE), 1,1,1-trichloroethane (111-TCA), and tetrachloroethene (PCE) were noted. Dichloromethane (CH_2Cl_2 , or methylene chloride, or MeCl_2) was also noted at significant concentrations. Chloroform and 1,2-dichloroethane may also be present at low concentrations in INLT_082005_104004, however it is difficult to tell because the 111-TCA and TCE concentrations are so high.

No spectral features were noted in the fingerprint region, the C-H stretching region or elsewhere in the sample spectra that would give the indication of alcohols or ketones at levels above the range of 0.5-1 ppm_v in the original samples. The detection limit range for these compounds is based upon the assumptions that (1) a spectral feature exists in the original sample at >0.003 absorbance units and that (2) the spectral feature can readily be distinguished from the major components (111-TCA and TCE) and background at a total sample pressure 600-640 mm Hg. In cases where the spectral features are overwhelmed by 111-TCA or TCE spectral features, the detection limits may be somewhat greater than the 0.5-1 ppm_v range. The importance of these alcohols and ketones compounds is related to the heat generated due to adsorption (or a surface reaction) which can apparently cause temperatures to reach temperatures sufficient to support combustion^f. Total volatile organic concentrations over 1000 ppm_v may also cause a significant heating^g, regardless of the type of compound.

Other compounds that were noted were simple hydrocarbons at 20-30 ppmv which were more closely related to the combination seen in kerosene than gasoline. An additional compound noted in the spectra associated with INLT_082005_104004 was possibly an ether. The only compounds in the spectral library used for the analysis that had the spectral feature near 2825 cm⁻¹ were ethers. Figures 1 and 2, show MTBE as the model compound since the spectral shape a 2525 cm⁻¹ was most similar, however, MTBE is not the compound since the rest of the spectral shape does not match well. Assuming MTBE, the ether-like compound concentration was estimated at ~38 ppm_v.

The exhaust sample is shown in Figure 4. The sample shows only trace levels of TCE and 111-TCA. Dichloromethane is at ~12.4 ppm_v. The elevated concentrations of dichloromethane relative to TCE and 111-TCA in the gas stream after the GAC column is not unexpected given the low affinity of dichloromethane for GAC^h.

f. [http://yosemite.epa.gov/oswer/ceppoweb.nsf/vwResourcesByFilename/carb-ads.pdf/\\$File/carb-ads.pdf](http://yosemite.epa.gov/oswer/ceppoweb.nsf/vwResourcesByFilename/carb-ads.pdf/$File/carb-ads.pdf),
http://www.frtr.gov/matrix2/section4/4_64.html

g. <http://www.envirotrol.com/Specs/VP-55.pdf>

h. <http://www.lenntech.com/adsorption.htm>

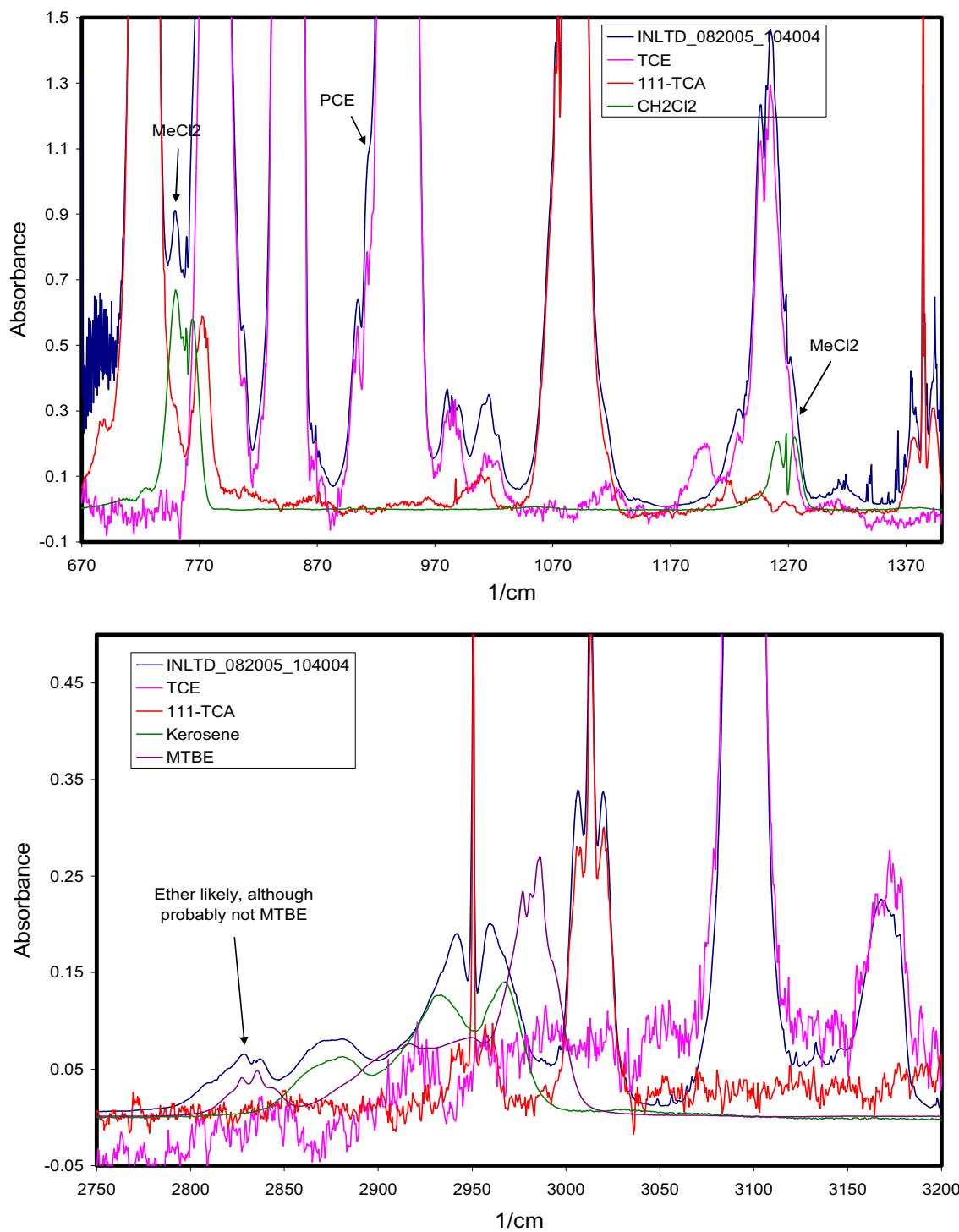


Figure 1. Mid IR spectrum of INLT_102005_104004 at 603 mm Hg in the fingerprint region (top) and the area of the C-H stretch (bottom) showing ~2880 ppmv TCE and 768 ppmv 111-TCA as the primary components. Dichloromethane is <=96 ppm_v. PCE is also present at an estimated 99 ppm_v. Hydrocarbons, here shown as kerosene at ~26 ppm_v, are also present as is a mystery compound that is likely an ether. MTBE is shown as a model ether compound at ~38 ppm_v for comparison.

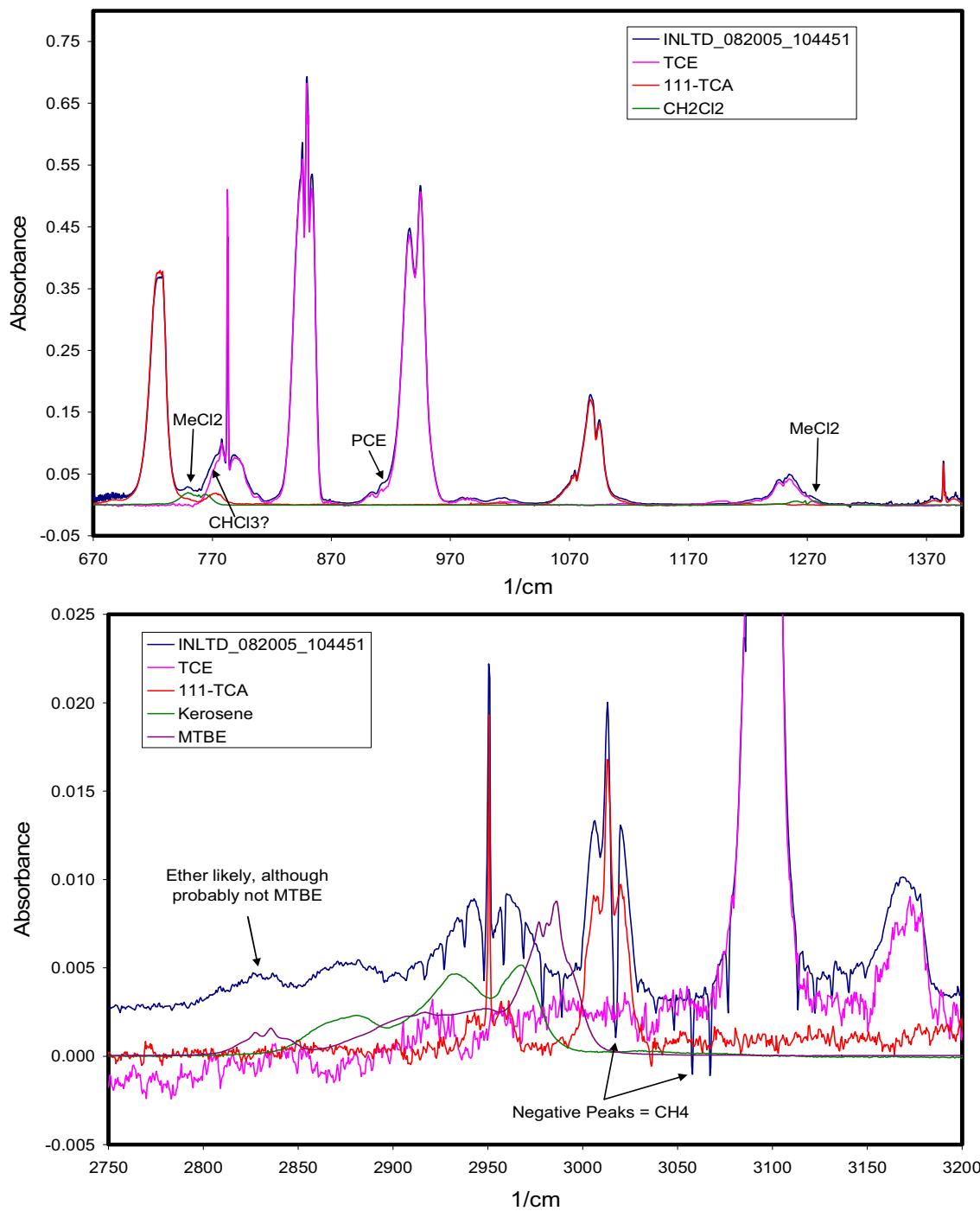


Figure 2. Mid infrared spectrum of INLT_082005_104451 (19.2 mm Hg) which is a dilution of INLT_082005_104004 (603 mm Hg) in the fingerprint region (top) and the area of the C-H stretch (bottom) showing ~2928 ppm_v TCE and 780 ppm_v 111-TCA as the primary components. Dichloromethane is <=93 ppm_v. PCE is also present at an estimated 102 ppm_v. Hydrocarbons, here shown as kerosene at ~22 ppm_v, are also present as is a mystery compound that is likely an ether. MTBE is shown as a model ether compound at ~38 ppm_v for comparison.

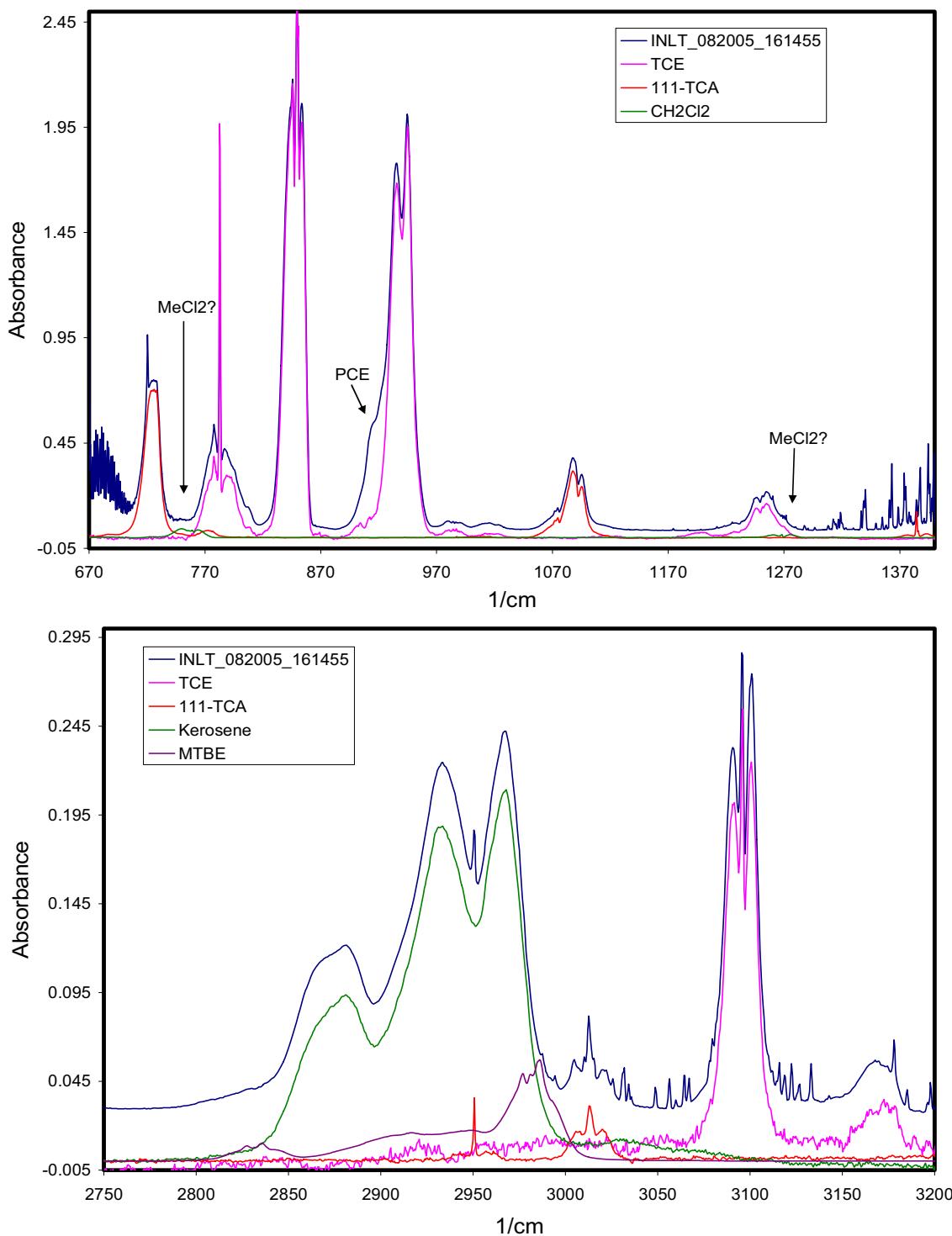


Figure 3. Mid infrared spectrum of INLT_082005_161455 (611.1 mm Hg) in the fingerprint region (top) and the area of the C-H stretch (bottom) showing \sim 355 ppm_v TCE and 45.5 ppm_v 111-TCA as the primary components. Dichloromethane is \leq 6 ppm_v. PCE is also present at an estimated 45 ppm_v. Hydrocarbons, here shown as kerosene at \sim 33 ppm_v. The mystery ether-like compound may be present but would be estimated at $<$ 8 ppm_v as MTBE.

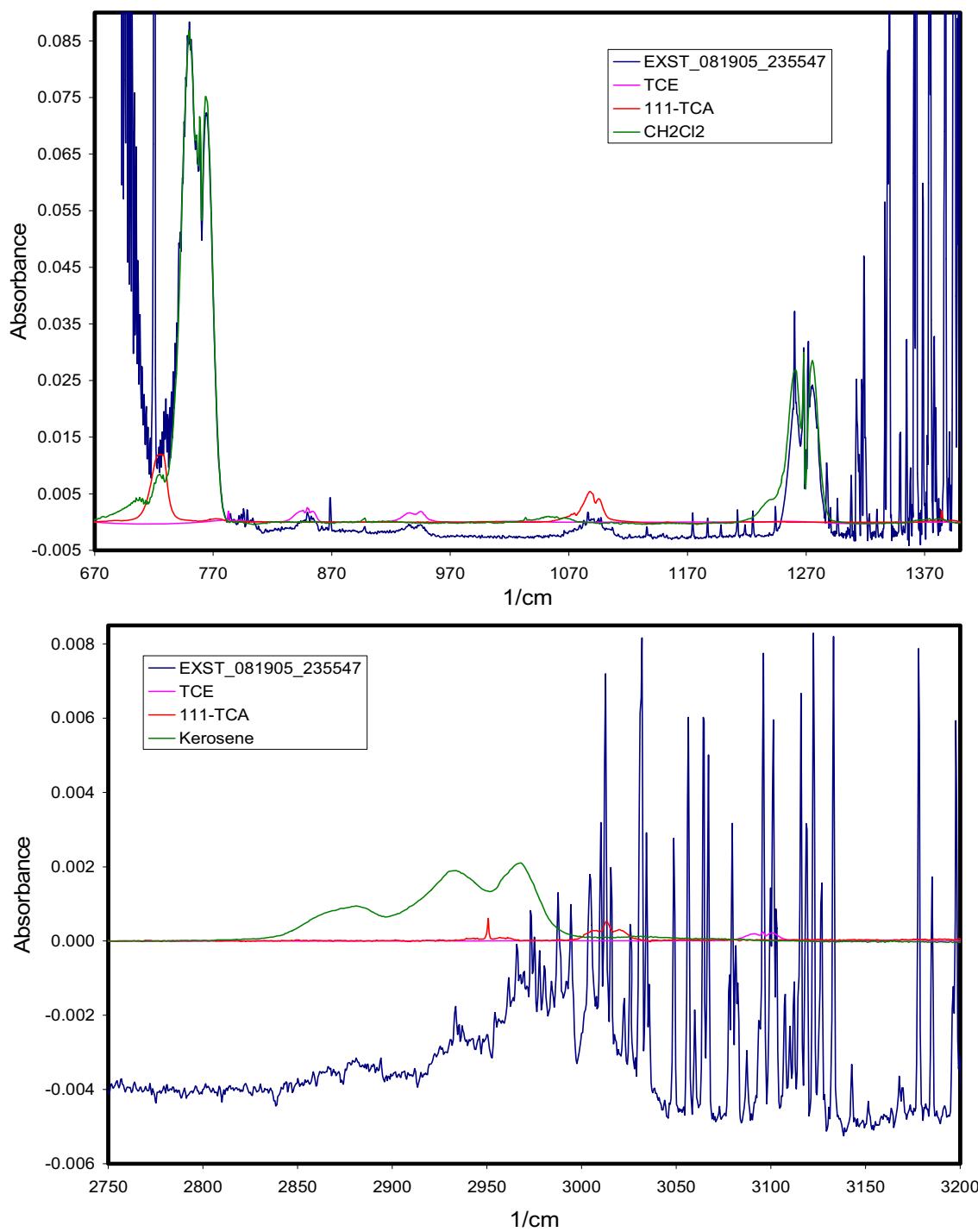


Figure 4. Mid infrared spectrum of EXST_08905_235547 (632.4 mm Hg) in the fingerprint region (top) and the area of the C-H stretch (bottom) showing ~0.34 ppmv TCE and 0.75 ppmv 111-TCA. Dichloromethane is the primary component at ~12.4 ppmv. Hydrocarbons, here shown as kerosene at ~32 ppmv.

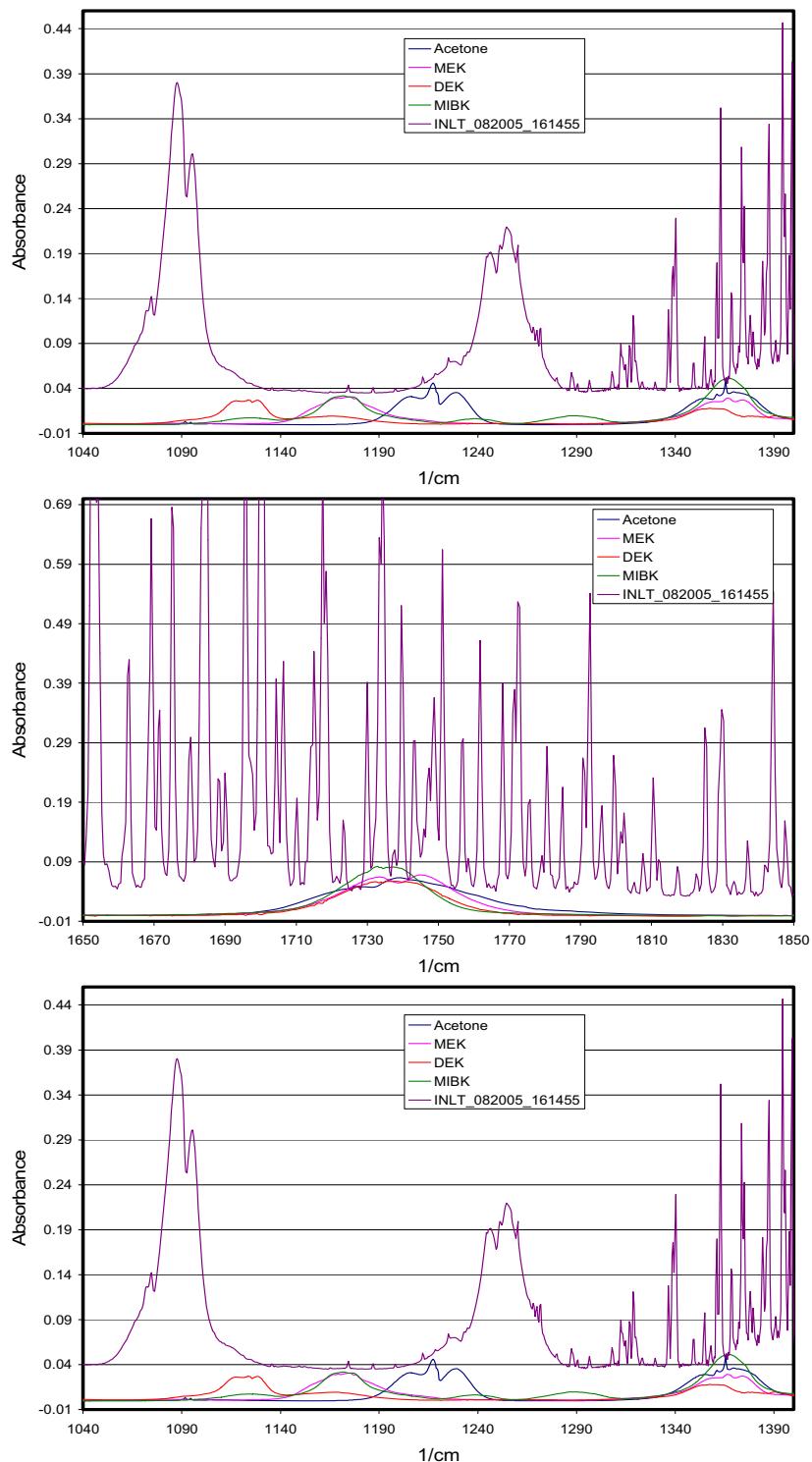


Figure 5. Evaluation of INLT_082005_161455 for common ketones (~14 ppmv)

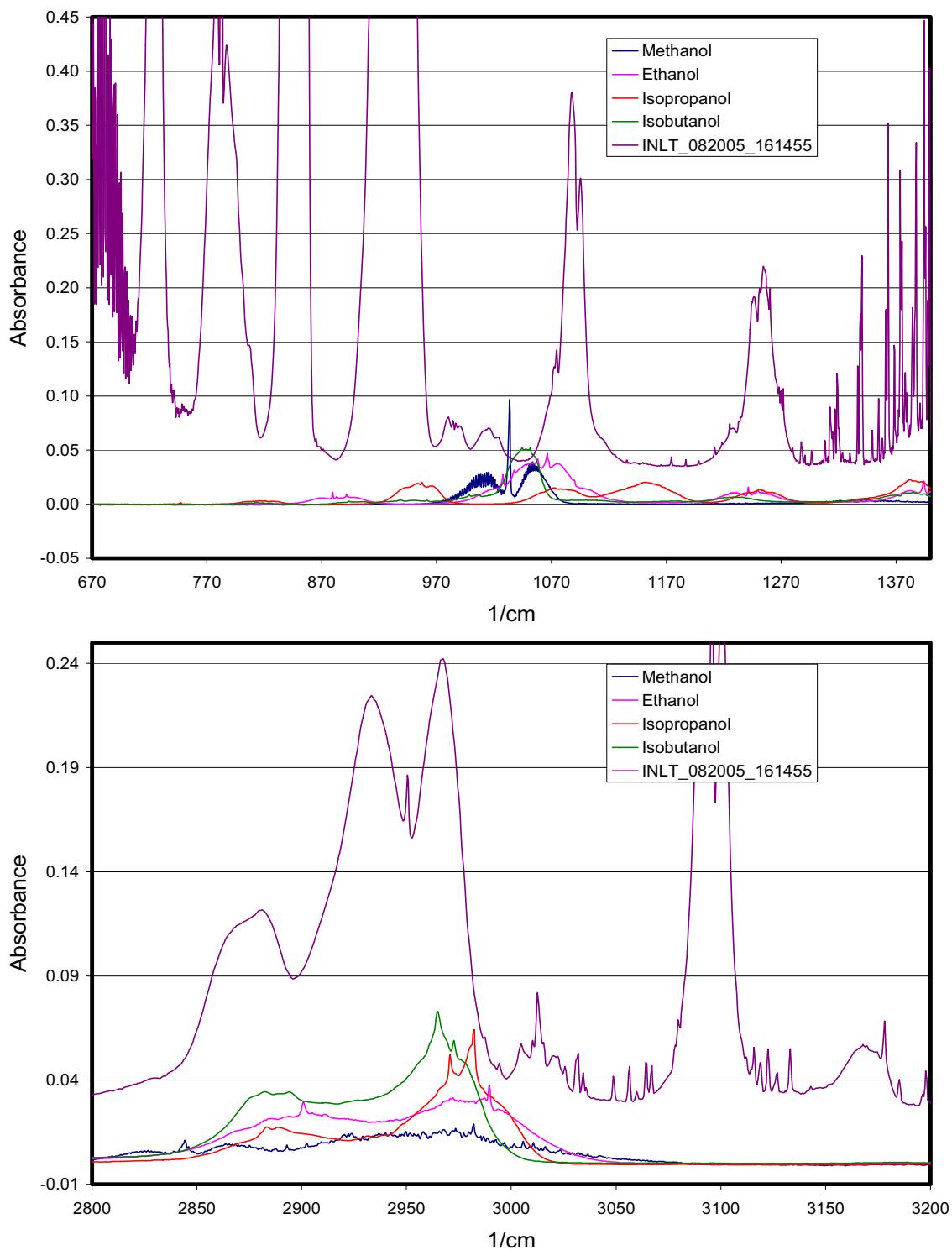


Figure 6. Evaluation of INLT_082005_161455 for common alcohols (~14 ppmv).

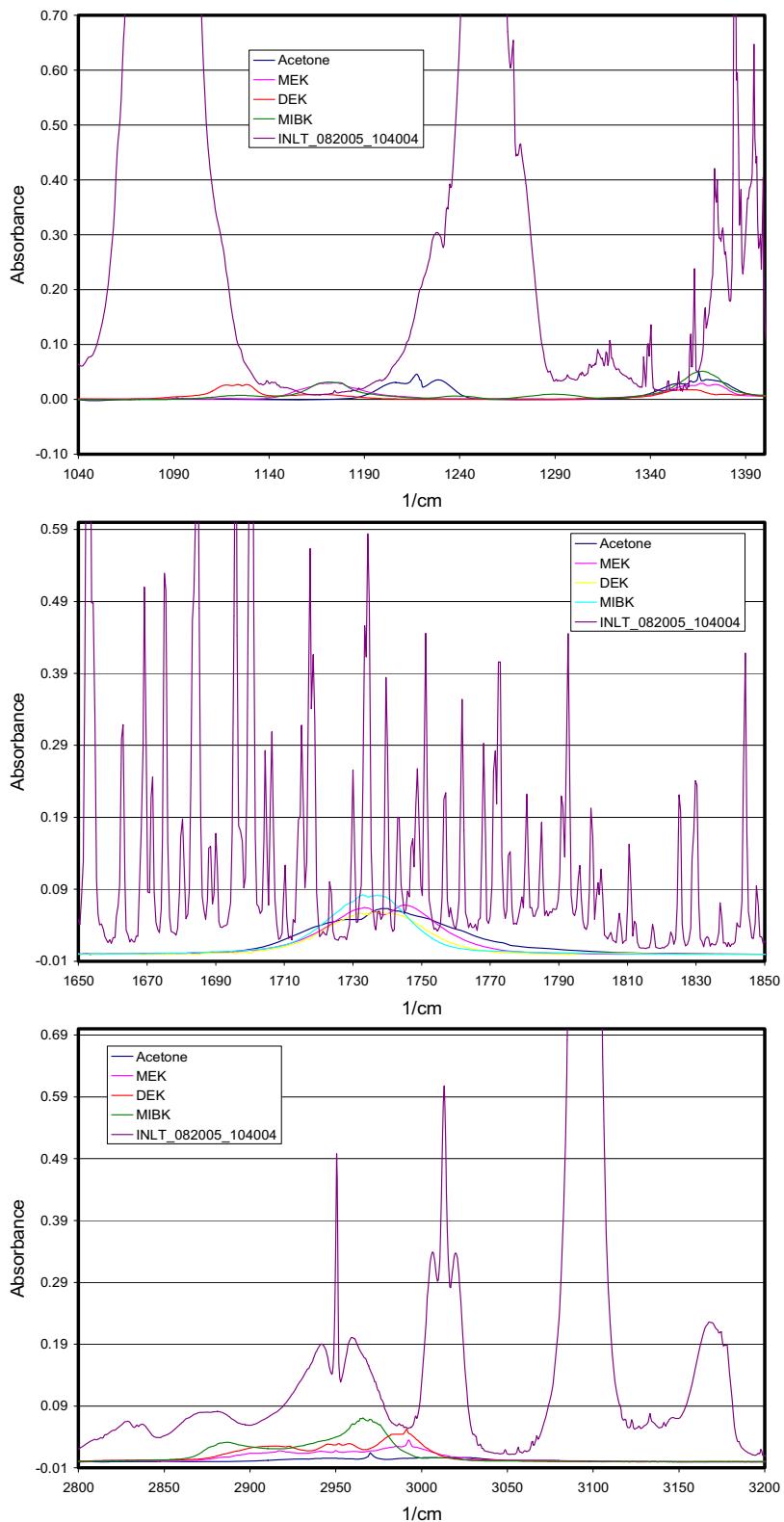


Figure 7. Evaluation of INLT_082005_104004 for common ketones (~14 ppmv)

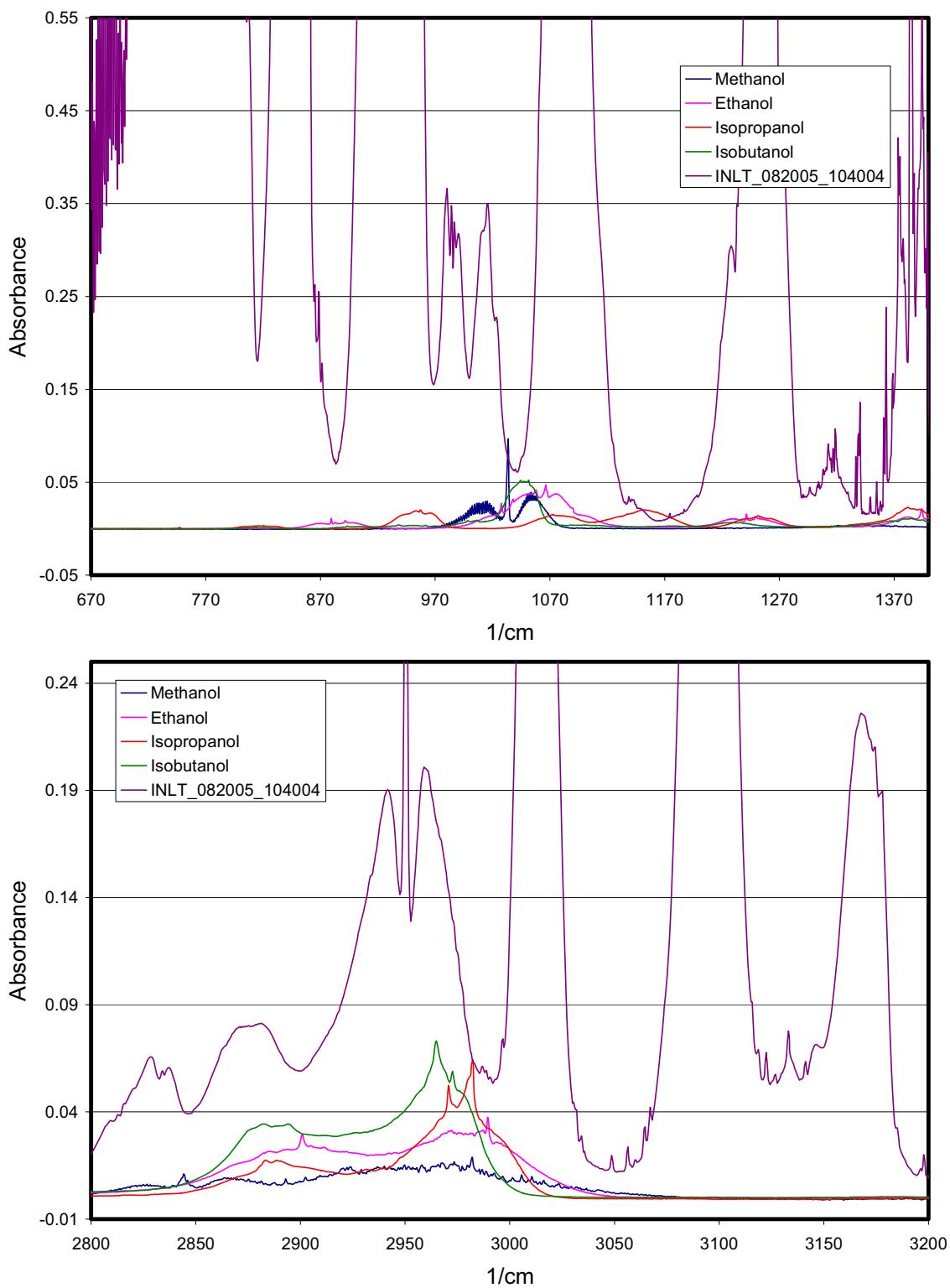


Figure 8. Evaluation of INLT_082005_104004 for common alcohols (~14 ppmv)

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Appendix B

Calculation of a 95% UCL using the Log-Normal Distribution

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Calculation of a 95% UCL using the Log-Normal Distribution

Let C_1 and C_2 are two VOC sludge phase concentrations for a given VOC, where $n=2$. The natural logs of these values produce the following two transformations: $y_1 = \ln C_1$ and $y_2 = \ln C_2$. Let y_{avg} represent the average of y_1 and y_2 and s_y represent the standard deviation of y_1 and y_2 . Values for the parameter H was taken from Table A-12 of "Statistical Methods for Envionrmental Pollution Monitoring" by Richard O. Gilbert, Ed. Van Nostrnd Reinhold, 1987. The value for the 95% UCL for H is a function of n and s_y . The 95% UCL for a lognormal distribution for a given VOC is the following formula:

$$C_{95\%UCL} = \exp \left[y_{avg} + 0.5s_y^2 + \frac{s_y H_{95\%}}{\sqrt{n-1}} \right]$$

To illustrate an example of the above formulation, consider the concentrations of two ($n=2$) TCE data points from Tank V-9:

$$\begin{aligned} C_1 &= 1.40E+4 \text{ mg/kg} \\ C_2 &= 2.20E+4 \text{ mg/kg} \end{aligned}$$

The natural logs for these are:

$$\begin{aligned} y_1 &= 9.55 \\ y_2 &= 10.00 \end{aligned}$$

The average and standard deviations for the y -values are 9.77 and 0.3196, respectively. The $H_{95\%}$ value for $n=2$ and $s_y = 0.3196$ is 8.20 (from Table A-12 of Gilbert).

$$95\% \text{ UCL for TCE in V9} = \exp \left[9.77 + 0.5(0.316)^2 + \frac{(0.3196)(8.20)}{\sqrt{(2-1)}} \right] = 2.54E+05 \frac{\text{mg}}{\text{kg}}$$

Tables 5, 6, and 7 show how these are used in the global sense.